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The performance comparison of active and passive funds during financial turmoil

Evidence from the Finnish, North American & European markets

School of Accounting and Finance
Master's thesis in Finance
Master's Degree programme in Finance

Vaasa 2025

UNIVERSITY OF VAASA
School of Accounting and Finance
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Title of the Thesis: The performance comparison of active and passive funds during financial turmoil : Evidence from the Finnish, North American & European markets
Degree: Master of Science in Economics and Business Administration
Programme: Master´s Degree Programme in Finance
Supervisor: Timo Rothovius
Year: 2025 **Sivumäärä:** 75

ABSTRACT:
This thesis investigates the effects of passive and active portfolio management on the performance and cost structures of mutual funds, with an additional focus on returns compared to benchmark indices during the 2019-2024 financial turmoil. The study examines how active portfolio management, and its related costs affect mutual fund performance. The study also analyses the returns and volatility of selected funds to their benchmark indexes between November 1, 2014, and October 31, 2024.

All data for the funds in this study have been collected from the LSEG Datastream service. The data focuses exclusively on mutual funds available to retail investors, and all returns are calculated in euros to achieve consistency and comparability between funds and indices. Exchange-traded funds (ETFs) are excluded from the analysis, which limits the analysis to traditional mutual funds. Key performance measures include return rates and risk-adjusted measures such as Sharpe ratio, Treynor ratio, information ratio, and Jensen's alpha, which allow for a comprehensive assessment of risk-adjusted returns.

The study found that passive funds consistently outperformed active funds regarding cost efficiency, risk-adjusted returns, and alignment with benchmark performance. While active funds occasionally offered opportunities for outperformance in specific contexts, their higher costs and inherent risks made them less favorable for the average retail investor. These findings underscored the value of passive funds as a reliable, cost-effective investment option for achieving long-term financial goals.

KEYWORDS: Mutual Funds, Portfolio Management, Equity Funds

VAASAN YLIOPISTO
Laskentatoimen ja rahoituksen yksikkö
Tekijä: Carolus Frilander
Tutkielman nimi: The performance comparison of active and passive funds during financial turmoil : Evidence from the Finnish, North American & European markets
Tutkinto: Kauppatieteiden maisteri
Oppiaine: Rahoitus
Työn ohjaaja: Timo Rothovius
Vuosi: 2025 **Sivumäärä:** 75

TIIVISTELMÄ:
Tässä tutkielmassa tutkitaan passiivisen ja aktiivisen salkunhoidon vaikutuksia sijoitusrahastojen suorituskykyyn ja kustannusrakenteeseen, ja lisäksi keskitytään tuottoihin verrattuna vertailuindekseihin vuosien 2019–2024 rahoitusmarkkinoiden myllerryksen aikana. Tutkimuksessa tarkastellaan, miten aktiivinen salkunhoito ja siihen liittyvät kustannukset vaikuttavat sijoitusrahastojen tuottoon. Tutkimuksessa analysoidaan myös valittujen rahastojen tuottoja ja volatiliteettia suhteessa vertailuindekseihin 1. marraskuuta 2014 ja 31. lokakuuta 2024 välisenä aikana.

Kaikki tiedot tässä tutkimuksessa tarkastelluista rahastoista on kerätty LSEG Datastream -palvelusta. Tiedot keskittyvät yksinomaan yksityissijoittajien saatavilla oleviin sijoitusrahastoihin, ja kaikki tuotot on laskettu euroina rahastojen ja indeksien välisen johdonmukaisuuden ja vertailukelpoisuuden saavuttamiseksi. Pörssinoteeratut rahastot (ETF) on jätetty analyysin ulkopuolelle, mikä rajoittaa analyysin perinteisiin sijoitusrahastoihin. Keskeisiä suorituskykymittareita ovat tuottoprosentit ja riskikorjatut mittarit, kuten Sharpe ratio, Treynor ratio, information ratio, ja Jensen's alpha, jotka mahdollistavat riskikorjattujen tuottojen kattavan arvioinnin.

Tutkimuksessa todettiin, että passiiviset rahastot olivat jatkuvasti parempia kuin aktiiviset rahastot kustannustehokkuuden, riskikorjatun tuoton ja vertailuindeksille pärjäämisen osalta. Vaikka aktiiviset rahastot tarjosivatkin toisinaan mahdollisuuksia paremmalle tuotolle tietyissä tilanteissa, niiden korkeammat kustannukset ja luontaiset riskit tekivät niistä epäedullisempia keskivertosijoittajalle. Nämä havainnot korostivat passiivisten rahastojen arvoa luotettavana ja kustannustehokkaana sijoitusvaihtoehtona pitkän aikavälin taloudellisten tavoitteiden saavuttamiseksi.

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1 Introduction

1.1 Introduction to research topic

Most citizens are customers of the banks in their own country. As part of the fundamental services provided to customers, such as bank visits or consultations, bank staff frequently offer them the chance to participate in the bank's actively managed investment funds. Mutual funds are extremely popular among retail investors due to their ease and convenience, as well as the fact that they represent a diverse portfolio of securities. However, it is critical to assess if such an investment is cost-effective given fund charges, particularly in the case of actively managed funds.

Actively managed funds have high fees because the fund manager conducts extensive research and makes active decisions in try to outperform the market. Passive investment funds, often known as index funds, are less well-known but equally accessible to retail investors. An index fund is a type of investment that seeks to replicate the performance of a specific market index using a rules-based investment strategy. As a result, index funds incur lower management expenses than actively managed funds.

The management costs of active funds, as well as the difference in added value of active portfolio management versus passive funds, highlight the critical decision that investors must make when choosing an investment strategy. While actively managed funds generally promise higher returns, they do not always outperform index funds when fund expenses are factored in. As a result, cost-conscious investors in financial markets have become more interested in passive investment strategies. The growing popularity of index funds demonstrates the necessity to examine investing objectives, costs, and expected returns to make smart financial decisions about fund selection in the future.

1.2 Purpose and limitation of the study

The purpose of this study is to examine the performance and profitability of active and passive funds through the eyes of retail investors. The study focuses specifically on the relationship between returns and costs, as well as funds' performance during times of financial turmoil. The financial turmoil period in this study ranges from 2019 to 2024, and it is compared to the years 2014 to 2019.

The research question is to examine whether active funds have been more profitable than passive funds during the financial turmoil period in 2019 - 2024? This research question is about the performance of active funds during the financial turmoil period 2019-2024, a period of exceptional market changes such as the COVID-19 pandemic, inflationary pressures, and geopolitical crises. The question seeks to determine whether active funds have benefited more from these market conditions than passive funds.

The first hypothesis is whether actively managed funds have produced higher total returns than passive index funds. The study attempts to discover whether active fund management provides value when compared to a passive strategy that tracks the market.

H1: Active funds have outperformed passive funds.

The second hypothesis is about the cost-effectiveness of active funds. Because active funds have higher management fees, the aim is to discover if the excess returns provided by these funds cover their costs. This is an important consideration for retail investors.

H2: It is not worthwhile for a retail investor to invest in an active fund considering the associated costs.

This thesis investigates the effects of passive and active portfolio management on the performance and cost structures of mutual funds, with an additional focus on returns compared to benchmark indices during the 2019-2024 financial turmoil. The study

examines how active portfolio management, and its related costs affect mutual fund performance, serving as a benchmark for passive index funds. The study also analyses the returns and volatility of selected funds to their benchmark indexes between November 1, 2014, and October 31, 2024. All data for the funds in this study have been collected from the LSEG Datastream service (LSEG Datastream). The data focuses exclusively on mutual funds available to retail investors, and all returns are calculated in euros to achieve consistency and comparability between funds and indices. Exchange-traded funds (ETFs) are excluded from the analysis, which limits the analysis to traditional mutual funds. Key performance measures include return rates and risk-adjusted measures such as Sharpe ratio, Treynor ratio, information ratio, and Jensen's alpha, which allow for a comprehensive assessment of risk-adjusted returns. The study also examines cost-effectiveness to see whether the higher costs of active management justify the results achieved compared to passive strategies. The literature review combines international and Finnish sources, providing a strong theoretical foundation that contextualises and supports the empirical results (Sharpe, 1966; Treynor, 1965; Jensen, 1968).

1.3 Structure of the research

This study begins with an introduction describing the background, objectives, and limitations of the study. The introduction is followed by an introduction to the theories of active and passive investing. After the theoretical background section, the study then defines and describes the financial turmoil. This is followed by a chapter of literature review of previous studies comparing passive and active funds. This chapter is divided into two parts, one in favor of passive funds and the other in favor of active funds. The literature review is followed by a chapter of the fund performance measures used in the study. The performance measures are followed by a description of the research methodology, the data, and the indicators used in the fund comparison. The results of the study are then analysed and summarised. Finally, the conclusion of the thesis is presented in the final chapter.

2 Theoretical background

This chapter aims to explore the key factors influencing the pricing of investment commodities, as well as the determinants of success for both actively and passively managed funds.

2.1 Modern Portfolio Theory

Markowitz developed Modern Portfolio Theory in 1952. The theory's basic premise is that diversification is advantageous. Diversifying investments spreads or reduces investment risk. When investment items are not correlated, they may produce adverse returns, making diversification important. A portfolio's value varies less than a single fund. The risk of investment securities is divided into two types: systematic or market risk and unsystematic risk. Unsystematic risk refers to the risk associated with a single investment that does not affect the returns of other assets. Diversification can help decrease unsystematic risk. Systematic risk is a market-wide risk that impacts all assets and cannot be avoided. When unsystematic risk is reduced, only systemic risk remains (Knüpfer and Puttonen, 2018).

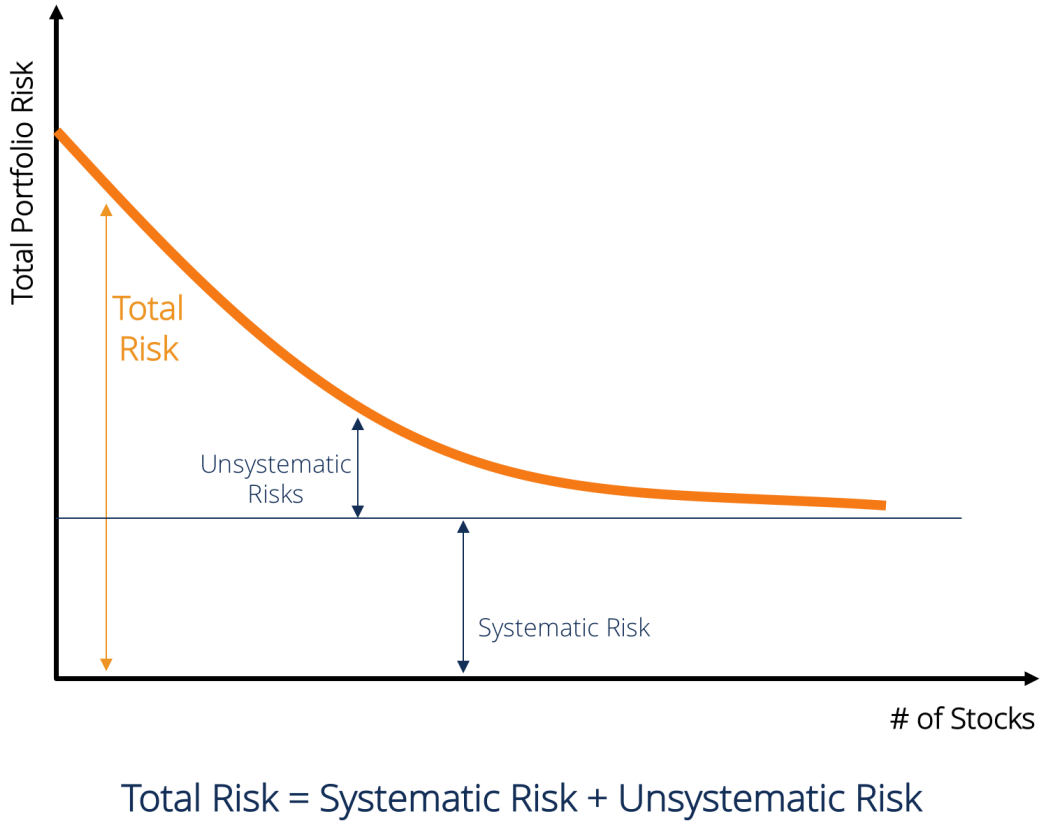

Figure 1. Unsystematic risk and systematic market risk. (Source: Corporate Finance Institute. (2024). Total Risk = Systematic Risk + Unsystematic Risk).

The efficient frontier is a crucial notion in current portfolio theory. A rational investor aims to maximise profit for a given degree of risk. These pairings are known as efficient portfolios. The efficient frontier is constructed by combining all efficient portfolios. In other words, an efficient portfolio that offers the appropriate degree of risk and optimal returns will always be located on the efficient frontier. This is the finest possible option. If another portfolio outperforms the initial one, the first portfolio is no longer efficient (Vishwanath & Krishnamurti, 2009, pp. 61-64; Sharpe, 1964, pp. 429-430).

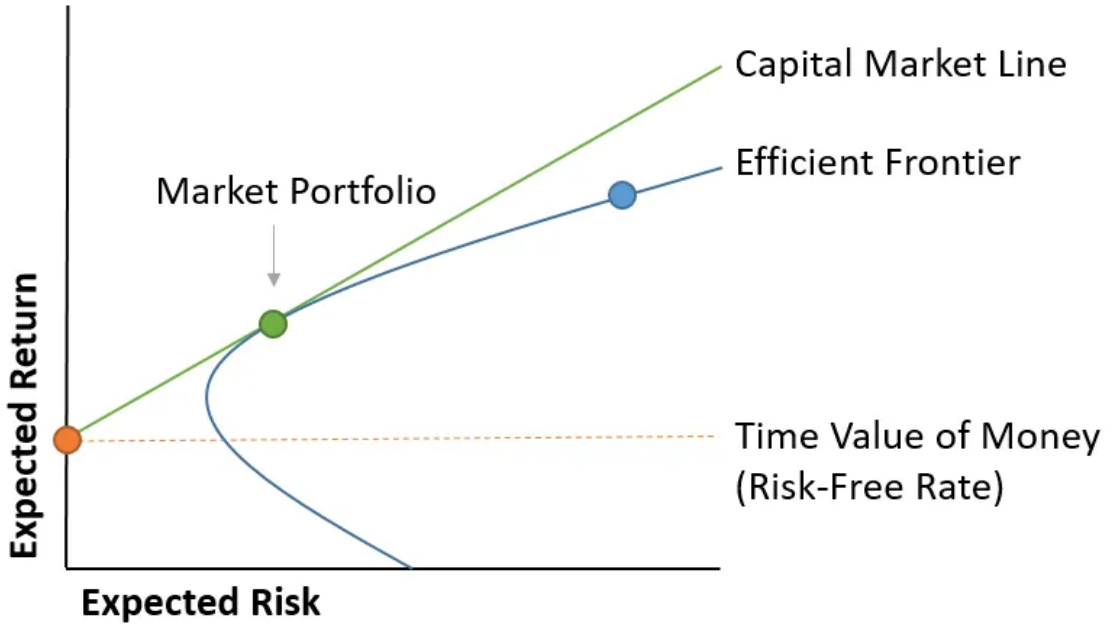

Figure 2. Efficient Frontier (Source: Value Investments. (2024). Capital Asset Pricing Model Illustration).

The portfolio that performs the best concerning risk is preferred by the investor. Every investor has a different level of risk tolerance and expected returns. The idea of efficient markets is also a part of Modern Portfolio Theory. Security prices reflect all relevant information in an efficient market (Sharpe, 1973, pp. 74–75). The returns obtained by novice investors were equivalent to those of a knowledgeable portfolio manager. However, the efficient market theory began to falter after the 1980s, as returns showed a positive correlation instead of being independent. During this time, future stock returns could be predicted. The advantages of diversification decrease as correlation rises. When correlation equals 1, returns move in the same direction, rendering diversification ineffective (Malkiel, 1995, p. 549; Knüpfer & Puttonen, 2018).

2.2 CAP-Model

William Sharpe introduced the Capital Asset Pricing Model (CAPM) in 1964, providing a method to calculate the expected returns on securities based on their systematic risk relative to the market (Sharpe, 1964). CAPM is grounded in Modern Portfolio Theory, developed by Harry Markowitz in 1952, which emphasizes diversification as a key

strategy for achieving the highest possible return at a chosen level of risk (Markowitz, 1952). According to this framework, investors distribute their assets across multiple investments to manage risk effectively while maximizing potential returns. CAPM assumes that investors are risk-averse and aim to optimize profits, calculating expected returns by focusing on the relationship between a security's beta and the overall market portfolio (Sharpe, 1964). The CAPM succinctly illustrates the fundamental relationship between risk and return, which is mathematically expressed as follows:

$$E(r_i) = r_f + \beta_i[E(r_m) - r_f], \quad (1)$$

Where $E(r_i) = Expected\ return\ on\ the\ security,$

$r_f = Risk\ free\ return,$

$\beta_i = Security\ beta,$

$E(r_m) = Market\ expected\ return.$

In CAPM, the risk can be classified into two categories: unsystematic risk, which can be mitigated through diversification, and systematic risk, which is inherent to the market and cannot be reduced by decentralization. Beta serves as a measure of systematic risk, with values greater than one indicating that a security is more volatile than the market, while values less than one reflect less volatility and, consequently, lower risk. CAPM operates under the assumption that portfolios are already diversified, meaning that the beta of individual securities determines their contribution to the portfolio's overall return (Bodie, Kane, & Marcus, 2005, pp. 282–283). As the CAPM equation illustrates, investors must accept higher levels of risk to achieve higher returns, if securities lie on the model's straight-line relationship between risk and return.

Elton, Gruber, and Blake (1996) explored the practical application of Modern Portfolio Theory and CAPM in constructing optimal equity fund portfolios. Their research compared portfolios of active equity funds and index funds over 12 years, demonstrating that active fund portfolios consistently outperformed their index fund counterparts at

equivalent risk levels. This finding highlights that Modern Portfolio Theory, when applied effectively, does not necessitate reduced profitability as risk decreases but rather enables investors to achieve maximum returns for a given level of risk (Elton, Gruber, & Blake, 1996). This underscores the model's utility in optimizing portfolio construction for both active and passive investment strategies.

2.3 Market efficiency

Eugene Fama's seminal 1970 study established the foundation for modern theories of financial market efficiency by introducing three levels of market efficiency: weak, semi-strong, and strong forms. In weak-form efficiency, securities prices reflect all historical price information, making it impossible to achieve excess returns through technical analysis. Semi-strong efficiency posits that securities prices incorporate all publicly available information, thereby negating the effectiveness of fundamental analysis for generating outperformance. Strong-form efficiency extends this further, asserting that even with insider information, it is impossible to achieve above-average returns because all information—both public and private—is fully embedded in prices. These hierarchical conditions imply that if strong-form efficiency holds, so must the weaker forms. Under such conditions, the role of active fund management becomes redundant, as even insider knowledge cannot identify underpriced securities. Consequently, paying fund managers for stock selection would be futile, and any observed success would be attributable to random chance rather than skill (Fama, 1970).

Despite the theoretical robustness of Fama's framework, the validity of strong-form efficiency in real-world markets has been widely debated. Malkiel (2003) observed that markets occasionally misprice securities, allowing for short-term excess returns, and argued that these deviations suggest inefficiencies may persist temporarily. Grossman (1976) further contended that if acquiring securities-related information incurs costs, markets must react to such information; otherwise, there would be no incentive to obtain it. Barberis and Shleifer (2003) attributed mispricing to investor trends, such as preferences for small-cap stocks, which can cause securities prices to deviate from intrinsic

values. Grossman and Stiglitz (1980) argued that markets cannot be fully efficient because investors require the incentive of undervalued securities to maintain market functionality. This perspective implies that active fund managers play a critical role in enhancing market efficiency through skilled stock selection, supporting the idea that superior performance need not be solely attributed to luck.

The concept of market efficiency is also central to the Random Walk theory, popularized by Burton Malkiel in A Random Walk Down Wall Street (1973). According to this theory, stock prices change only in response to new and unexpected information, rendering historical price data irrelevant for predicting future movements. Malkiel famously illustrated this with a parable suggesting that a portfolio chosen randomly—such as by a dart-throwing chimpanzee—could perform as well as one selected by a professional manager. This randomness underscores the challenges of consistently outperforming the market (Malkiel, 1973).

However, deviations from market efficiency, known as anomalies, challenge the universality of Fama's hypothesis. While Fama (1998) maintained that anomalies do not invalidate the efficient market hypothesis—arguing they are often short-lived—other researchers have highlighted their potential implications. Ball (2009) concurred, asserting that anomalies are necessary for market functionality and that no theory can fully account for global stock price behaviour. Schwert (2003) demonstrated that many anomalies weaken or disappear when publicly disclosed, suggesting they may represent one-time opportunities rather than enduring inefficiencies. This dynamic highlights the potential for active fund managers to exploit anomalies to achieve benchmark outperformance, a capacity not available to passive index funds.

In summary, while the efficient market hypothesis provides a compelling framework for understanding securities pricing, debates about anomalies and market inefficiencies suggest that opportunities for active management may exist under certain conditions. Active fund managers who successfully discover and exploit anomalies improve the

overall efficiency of financial markets, highlighting the complex interplay between theoretical market efficiency and real investing methods.

2.4 Fund Management

This chapter provides an overview of active and passive fund management, highlighting their key differences.

2.4.1 Active

Active portfolio management refers to an investment strategy in which a portfolio manager makes active decisions about buying and selling securities to outperform a benchmark index. This approach is based on the assumption that markets contain mispriced securities, which can be exploited to achieve higher returns compared to passive investing (Grinold & Kahn, 1999).

Active portfolio management techniques include fundamental analysis, which assesses the financial condition and prospects of companies, as well as quantitative analyses that leverage statistical models to support investment decisions. The primary objective is to identify mispriced securities and capitalize on market inefficiencies (Elton et al., 2014).

Additionally, active management plays a role in maintaining market efficiency. Active investors contribute to price discovery by participating in the market and providing liquidity, which enhances the accuracy of price formation and market functionality (Grossman & Stiglitz, 1980).

While active portfolio management aims to exceed market returns by identifying and leveraging inefficiencies, its success is inherently uncertain. Moreover, the higher costs associated with active management, including transaction fees and management expenses, can erode net returns for investors. For this reason, many experts recommend

passive investment strategies, particularly for retail investors who benefit from lower costs and returns that closely track market performance (Petajisto, 2013).

2.4.2 Passive

Passive portfolio management, also known as passive investing, is an investment strategy that aims to replicate the returns of a specific market index without actively selecting securities or attempting to time the market (Malkiel, 2003). This approach is founded on the assumption that markets are efficient, meaning that all available information is already reflected in security prices, making it challenging to exploit undervalued individual stocks (Fama, 1970). The goal of passive portfolio management is to achieve average market returns while minimizing trading costs and management fees (Fama & French, 2010).

Passively managed funds, such as index funds and exchange-traded funds (ETFs), track a specific market index, such as the S&P 500, by investing in the securities included in the index in the same proportions as they are represented in the index (Bogle, 1999). This strategy enables broad diversification and low management costs compared to actively managed funds, where portfolio managers aim to outperform the market through active investment decisions (Elton et al., 2014).

The advantages of passive portfolio management include lower costs, broader diversification, and more predictable returns that align with the average performance of the market (Malkiel, 1973). However, a passive strategy does not seek to exploit potential market anomalies or inefficiencies, which may limit opportunities for excess returns (Fama, 1998). Despite this limitation, passive portfolio management has proven to be an effective approach for many investors, particularly those seeking a cost-efficient and diversified investment strategy (Bogle, 2016).

3 Financial turmoil

Economic instability, or shock, is usually exogenously or endogenously caused and encompasses a broad range of disruptive events that have a great impact on financial markets, economies of the world, and investor confidence. These interruptions emanate from various factors, such as geopolitical conflicts, trade disputes, natural disasters, pandemics, and systemic financial crises. The COVID-19 pandemic, which started in 2019, is one key event that amplified global economic uncertainty, creating far-reaching turmoil across financial markets. Adding to this came geopolitical conflicts, such as the 2022 Russian attack on Ukraine, further compounding the global economic problems by increasing investor perceptions of risk and complicating recoveries. Events of this nature show that financial crises often come in many forms, thus enabling them to cause damage on a global economic system (Shehzad et al., 2021).

3.1 Covid-19 Pandemic

The COVID-19 pandemic, which began in early 2020, had profound repercussions across the global economy, culminating in the most severe worldwide economic downturn since the financial crisis of the early 2000s (World Bank, 2022). While the pandemic acted as a symmetric external shock affecting nations globally, its consequences were asymmetrical, reflecting variations in economic structures and resilience across countries and industries (European Commission, 2021). The crisis disrupted multiple facets of economic activity, including production, trade, investment, employment, consumption, and financial systems, resulting in widespread economic instability (Kok, Mongelli, & Hobelsberger, 2022).

Typical recessions follow a familiar pattern: economic activity slows, investments decline, unemployment rises, incomes fall, and consumer spending decreases. The recession deepens until recovery is initiated through effective monetary and fiscal policies, stimulating investment, consumption, employment, and production (Ehnts & Paetz, 2021). However, the COVID-19 pandemic deviated from this norm. Unlike previous crises, swift

and extensive economic policies were implemented to mitigate the pandemic's immediate impact on human health and livelihoods. While these measures were critical in alleviating the short-term effects, they introduced long-term risks, such as elevated private and public debt levels, which continue to hinder economic recovery and could precipitate further recessionary pressures without ongoing intervention (World Bank, 2022).

The pandemic also reshaped global economic expectations, altering perceptions and attitudes toward future economic conditions. The uncertainty surrounding the crisis's duration and severity prompted heightened caution among businesses, consumers, and investors (Ambrocio, 2022). This resulted in reduced investment, lower consumer spending, and increased savings, as economic agents sought to fortify their financial positions amidst ongoing uncertainty. Moreover, the surge in public debt due to extensive fiscal stimulus raised concerns about long-term debt sustainability and fiscal stability, further dampening economic confidence.

Global stock markets also experienced significant volatility during the pandemic's onset. Major indices, such as the S&P 500, Nasdaq Composite, Dow Jones Industrial Average, and STOXX 600, recorded sharp declines as uncertainty and fear dominated investor sentiment. Pandemic-induced economic uncertainty triggered widespread selling pressure, leading to steep market declines (Liu, Huynh, & Dai, 2021). However, decisive central bank interventions, expansive fiscal stimulus measures, and optimism regarding vaccine development spurred a robust market recovery. As vaccination campaigns progressed and economies reopened, investor confidence improved, driving stock prices upward. Certain sectors, such as technology, healthcare, and e-commerce, thrived during this period, benefiting from increased demand for remote work solutions, medical products, and online services. In contrast, industries dependent on physical presence, such as travel, hospitality, and retail, struggled under lockdowns and social distancing measures (Hoekstra & Leeflang, 2020). Ultimately, the stabilization and recovery of financial markets were driven by a combination of supportive monetary policies, fiscal measures, vaccine optimism, and adaptive strategies across industries.

3.2 The Russian invasion

The Russian invasion of Ukraine in February 2022 represents an escalation of the ongoing conflict that began in 2014 with Russia's annexation of Crimea. On February 21, 2022, Russian President Vladimir Putin formally recognized the self-declared Luhansk and Donetsk republics as independent entities, followed by the announcement of a full-scale military operation on February 24, 2022 (Kokkonen & Romsi, 2022).

The invasion triggered widespread uncertainty in markets and societies, driven by fears of war escalation and potential nuclear incidents (Martins, Correia, & Gouveia, 2023). Caldara and Iacoviello (2022) emphasize that the conflict's impact on Europe has been more extensive and significant than other wars or political events since World War II. Their geopolitical risk index highlights the unprecedented level of geopolitical threat coinciding with Russia's actions in Ukraine (Martins et al., 2023).

The economic repercussions of the invasion have been particularly pronounced in European financial markets. Ahmed, Hasan, and Kamal (2023) analysed the effects of the Russia–Ukraine crisis on European stock performance, revealing that geographical proximity to the conflict, heightened political uncertainty, and the imposition of sanctions against Russia led to negative reactions in financial markets. Their study observed significant abnormal negative returns in European stocks on February 21, 2022, corresponding with Russia's recognition of the Donetsk and Luhansk regions as independent entities. These adverse reactions persisted beyond this initial event, with varying impacts observed across industries, countries, and firm sizes (Ahmed, Hasan, & Kamal, 2023).

This evidence underscores the profound economic and geopolitical implications of the Russia–Ukraine conflict, with ramifications extending far beyond the immediate theatre of war.

4 Literature review

This chapter provides a comprehensive examination of prior research on active and passive mutual funds, particularly emphasizing the role and influence of fund managers in determining fund performance. The analysis centres on the comparative evaluation of actively managed funds against their respective benchmark indices, aiming to elucidate the effectiveness and outcomes of active fund management strategies about market benchmarks.

4.1 Studies supporting passive mutual funds

Research on the performance of actively managed investment funds compared to their benchmark indices has produced mixed results, reflecting the complexity and variability of active management effectiveness. While some studies suggest that active management can occasionally generate alpha, net of fees and expenses, most actively managed funds underperform their benchmarks over the long term. For instance, evidence shows that active stock pickers—those with high Active Shares—often outperform their benchmarks, whereas "closet indexers" and funds employing minimal active management tend to underperform, primarily due to fees (Petajisto, 2013). However, performance outcomes are highly sensitive to variables such as the time intervals studied, methodological frameworks, and prevailing market conditions. For example, during periods of heightened volatility, the value added by active management can diminish significantly (Wessels, 2004). Moreover, costs associated with active management—such as management fees and transaction costs—often erode potential performance gains, diminishing net returns for investors (Fahling, Steurer & Sauer, 2019).

Seminal studies, such as those conducted by Sharpe (1966) and Jensen (1968), underscore the challenges of achieving superior net returns through active strategies. Sharpe (1966) found that after accounting for costs, most actively managed funds underperformed the Dow Jones Industrial Average (DJIA), which was used as a benchmark. When costs were excluded, however, these funds generally achieved higher returns than the

benchmark, highlighting the critical impact of expenses on net performance (Sharpe, 1966). Similarly, Jensen (1968) concluded that fund managers failed to outperform portfolios constructed randomly, with index investing proving to be a more reasonable strategy due to its superior risk-adjusted returns (Jensen, 1968).

Further studies have corroborated these findings while expanding the discussion on investor behavior and cost structures. Malhotra and McLeod (1997) questioned whether the success of some active funds could be attributed to skill or mere chance, emphasizing the importance of low-cost funds for optimal investment outcomes (Malhotra & McLeod, 1997). Carhart (1997) similarly found no evidence of consistent managerial skill, demonstrating that trading costs alone reduced fund performance by an average of 0.95%, further bolstering the case for cost-efficient index funds (Carhart, 1997). Gruber (1996) highlighted the paradox of investor behavior, noting that despite evidence favoring index funds, many investors continued to allocate capital to actively managed funds, potentially due to marketing or perceived prestige rather than performance (Gruber, 1996).

Malkiel (1995) and Malkiel and Rosti (2012) extended this critique, arguing that the statistical improbability of identifying actively managed funds capable of long-term outperformance makes index funds a more viable option for the majority of investors. Their findings emphasized the predictability and cost-effectiveness of index funds in providing consistent market exposure (Malkiel, 1995; Malkiel & Rosti, 2012). Additionally, Gil-Bazo and Ruiz-Verdú (2009) discovered that the most expensive active funds were often the weakest performers, suggesting that price-insensitive investors allowed such funds to maintain high fees. In contrast, successful funds tended to lower their fees to enhance competitiveness (Gil-Bazo & Ruiz-Verdú, 2009).

Benchmark selection also plays a crucial role in evaluating fund performance. Statman (2000) demonstrated that the Domini Social Index, which focuses on socially responsible companies, outperformed the Standard & Poor’s 500 index over the study period. This

finding underscores the importance of selecting appropriate benchmarks, as index characteristics significantly influence investment outcomes. Statman also observed that index funds generally outperformed actively managed funds, reaffirming the advantages of passive investing (Statman, 2000).

Regarding fund costs, Wermers (2000) found that while active funds outperformed benchmarks by an average of 1.3% annually before costs, they underperformed by 1% after accounting for expenses. He attributed 1.6 percentage points of this discrepancy to fund costs, emphasizing the pivotal role of expense management in determining net returns (Wermers, 2000).

Collectively, these studies highlight the challenges inherent in active management, particularly the impact of high costs, and reinforce the argument for cost-effective index investing as a superior strategy for most investors seeking consistent and predictable market exposure.

4.2 Studies in favour of active mutual funds

The research presented highlights a significant debate regarding the relative efficacy of active versus passive investment strategies. On one hand, a substantial body of evidence suggests that investors should generally avoid actively managed funds in favor of passive funds or, at a minimum, employ a buy-and-hold strategy. Studies consistently show that active fund managers often fail to add significant value, as fund-related costs consume a considerable portion of revenues. For instance, Baks, Metrick, and Wachter (2001) analyzed 1,437 fund managers and found no evidence that active funds outperformed their benchmarks on average, though they could not completely rule out the possibility that the success of certain funds was due to skill rather than luck. Similarly, research often emphasizes the inability of most fund managers to sustain outperformance over time, reinforcing the appeal of low-cost passive funds. However, arguments in favor of active management focus on evaluating whether certain fund managers can consistently

outperform their benchmarks over multiple periods, with some studies providing evidence of short-term persistence in performance.

Grinblatt and Titman (1992) found that historically successful funds exhibited continuity in their short-term returns, with past success linked to future performance. Elton et al. (1996) corroborated these findings, noting that successful funds tended to maintain consistent costs despite opportunities to raise fees, thus benefiting investors with superior products at stable prices. Zheng (1999) added that funds with higher new inflows tended to outperform those experiencing redemptions, further suggesting that investor demand correlates with fund success. Additionally, Hendricks, Patel, and Zeckhauser (1993) found evidence of performance persistence over short periods, with top-performing funds maintaining superior returns for about a year, although consistency diminished over longer time horizons. Their study also noted significant differences in risk-adjusted returns, with top funds outperforming bottom funds by 6–8% annually.

Further complicating the picture, Chevalier and Ellison (1999) examined fund manager characteristics, discovering a positive correlation between certain attributes—such as graduating from elite universities—and fund performance. This suggests that the individual qualities of fund managers may influence outcomes, offering an alternative perspective on the potential value of active management. Similarly, Bhootra, Drezner, Schwarz, and Stohs (2015) concluded that the top 25% of fund managers demonstrated skill rather than luck, though they noted that maintaining profitable strategies over time is challenging due to imitation by competitors, analogous to the need for sports teams to innovate strategies to sustain competitive advantage.

Daniel, Grinblatt, Titman, and Wermers (1997) explored whether active funds could systematically identify superior stocks, finding that funds employing unconventional strategies outperformed those based on traditional approaches like momentum or value investing. This suggests that certain fund managers possess the ability to implement innovative strategies to achieve market outperformance, particularly when aggressively

pursuing higher returns. Petäjistö (2013) further examined the degree of fund management activity, finding that the most active stock-picking funds outperformed their benchmarks by approximately 1.26% annually after costs, whereas "closet index funds"—funds marketed as active but closely tracking their benchmarks—performed the worst, primarily due to high fees relative to their limited deviation from the index.

In summary, there is no clear academic consensus regarding the superiority of active versus passive investment strategies. While most studies favour passive funds due to their lower costs and consistent performance, some research supports the notion that skilled fund managers can deliver value in specific contexts, albeit often for limited durations. Ultimately, the evidence suggests that while passive funds may be the optimal choice for most investors, certain actively managed funds, particularly those with high levels of stock-picking activity or unique strategies, may provide value under the right circumstances. However, identifying such funds remains a significant challenge for the average investor.

5 Fund performance measures

This chapter highlights the main performance measures used in the assessment of the performance of investment funds. These include the Sharpe ratio, Treynor ratio, Information ratio, Jensen's alpha, and R-squared. Individually, each of these measures contributes to forming a strong basis for performance evaluation, especially regarding risk-adjusted returns and congruence with benchmark index performances. In this work, the selected funds are thoroughly examined and compared based on these established quantitative measures.

The formula below was used in computing the monthly returns for the funds and benchmark indices over the periods of the study.

$$r_p = LN(\frac{p_t}{p_{t-1}}), \quad (2)$$

Where $r_p = Fund's\ monthly\ return,$

$p_t = The\ value\ of\ the\ fund\ at\ time\ t,$

$p_{t-1} = The\ value\ of\ the\ fund\ at\ time\ t-1.$

5.1 Sharpe ratio

It was Sharpe (1964) who introduced what became known as the Sharpe ratio—a methodology designed to evaluate an investment's performance by balancing risk and return. The Sharpe ratio calculates a portfolio's excess return over the risk-free rate, divided by its standard deviation, to measure the total risk or volatility of the portfolio. A greater Sharpe ratio shows superior risk-adjusted returns, implying that the investment earned more returns per unit of risk incurred (Sharpe, 1964).

$$Sharpe\ ratio = \frac{r_i - r_f}{\sigma_i}, \quad (3)$$

Where $r_i = Average\ Fund\ Return,$

$r_f = Average\ Risk\ Free\ Return,$

$\sigma_i = Fund\ Volatility.$

5.2 Treynor ratio

Treynor (1965) established the Treynor ratio, which measures investment returns in relation to systematic risk. Like the Sharpe ratio, it assesses a portfolio's risk-adjusted performance. However, rather of using overall volatility as a risk indicator, the Treynor ratio employs beta, which measures the portfolio's susceptibility to systematic market risk. By focussing on beta, the Treynor ratio considers just non-diversifiable, market-related risk rather than total risk. This distinction makes the Treynor ratio especially useful for evaluating well-diversified portfolios that have largely removed unsystematic risk (Bodie, Kane, & Marcus, 2005, p. 868).

$$Treynor\ ratio = \frac{r_i - r_f}{\beta_i}, \tag{4}$$

Where $r_i = Avereage\ Fund\ Return,$

$r_f = Average\ Risk\ Free\ Return,$

$\beta_i = Fund\ Beta.$

5.3 Information Ratio

The Information Ratio (IR) is a key performance evaluation metric that quantifies the relationship between a fund's active return—defined as the difference between its return and its benchmark—and its tracking error, representing the active return's standard deviation.

$$Information\ Ratio = \frac{R_i - R_b}{\sigma(R_i - R_b)}, \tag{5}$$

Where $R_i = Average\ Fund\ Return,$

$R_b = Average\ Benchmark\ Return,$

$R_i - R_b = Active\ Return,$

$\sigma(R_i - R_b) = Tracking\ Error,$

$Tracking\ Error = Standard\ Deviation\ of\ Active\ Return.$

A greater Information Ratio shows that the fund provides higher returns per unit of risk than its benchmark. This statistic is handy for assessing active fund management efficiency since it represents the fund manager's ability to consistently generate extra returns, or alpha while managing volatility (Elton et al., 1981).

A positive IR larger than zero implies superior performance relative to the benchmark, whereas a negative IR suggests inferior performance. The magnitude of the IR not only assesses the fund manager's ability, but it also acts as a standard for evaluating various active investment methods (Crack and Grieves, 2017). As a result, the Information Ratio is frequently used in institutional portfolio management to match performance results with strategic risk-taking goals (Schulmerich et al., 2015).

5.4 Jensen's alpha

Jensen's alpha is a simple outcome measure, designed by Michael C. Jensen in 1968 within the Capital Asset Pricing Model or CAPM. It tells about the risk-adjusted performance of an investment fund in relation to the actual returns against the CAPM-theoretic return, which is calculated using beta—a measure of the covariation of a redemption with the return from a benchmark. Formula for Jensen's alpha is expressed as:

$$\alpha = r_i - [r_f + \beta_i \left(r_m - r_f\right)], \tag{6}$$

Where $r_i = Average\ Fund\ Return,$

$r_f = Average\ risk\ free\ rate,$

$\beta_i = Fund\ Beta,$

$$r_m = Average\ Return\ of\ Market\ Index.$$

A positive alpha indicates that the returns of the fund were above what was expected by the CAPM, which signals good managerial performance or successful exploitation of market inefficiencies. A negative alpha suggests underperformance against the benchmark provided by CAPM and reflects inefficiency in either the strategy or management in running the investment activities of the fund (Fabozzi, Gupta & Markowitz, 2002).

Jensen's alpha has several applications in empirical finance and portfolio management as it develops a more formal framework for evaluating how much additional value active fund managers could generate based on risk-adjusted benchmark evaluations (Schulmerich et al., 2015).

5.5 R-squared (R^2)

R-squared is a statistical measure used to indicate the proportion of fund returns that are described by returns on the benchmark index or wider market. It gives an idea of the extent to which the performance of the mutual fund is in line with its benchmark performance (Fabozzi, Gupta & Markowitz, 2002). Mathematically, R^2 is calculated using the following formula:

$$R^2 = \frac{Cov(R_f, R_b)^2}{Var(R_b)\,Var(R_f)}, \qquad (7)$$

Where $R_f = Return\ of\ the\ fund,$

$R_b = Return\ of\ the\ benchmark,$

$Cov(R_f, R_b) = Covariance\ between\ the\ fund\ and\ benchmark\ returns,$

$Var(R_b) = Variance\ of\ the\ benchmark\ returns,$

$Var(R_f) = Variance\ of\ the\ fund\ returns.$

R^2 ranges from 0 to 1. An R^2 value of 1 indicates that the benchmark return explains all the variation in returns; this reflects a perfect positive correlation. Conversely, if the R^2 value is 0, there is no relationship between the return of the fund and that of the benchmark; the latter therefore offers no power of explanation on the performance of the fund (Schulmerich et al., 2015).

High R^2 values indicate that much of the movement in the fund's return comes from the movements of the benchmark index. This should not be surprising because this would be expected of a passive investment that is trying to mimic or clone an index. Actively managed funds often show low R^2 since their results are less correlated with the benchmark, indicating the decisions taken by the active fund manager (French, 2010).

6 Research method and material

6.1 Method

This study utilized a quantitative research methodology, analysing statistical data from the monthly returns of 54 active and index equity funds invested across the United States, Finland, and Europe. The analysis spanned 10 years from November 1, 2014, to October 31, 2024, with all monthly values for the funds and indices obtained from the LSEG Datastream service, ensuring comprehensive and reliable data collection. To preserve the integrity of the dataset, any funds with missing monthly values or yearly charges were excluded. The inclusion criteria mandated that all funds be accessible to retail investors and operate under an accumulating income treatment structure, whereby returns are reinvested into the fund. This criterion ensured uniformity across the dataset and enhanced the relevance of the study to its intended objectives.

The dataset comprised 54 investment equity funds, including 14 index funds and 40 actively managed funds, each operating in Finnish, European, or North American markets. The funds were benchmarked against the S&P 500, OMXH, and MSCI Europe indices, creating a robust framework for comparing fund performance across diverse geographic markets and investment strategies. All funds were retrieved in euros via LSEG Datastream, standardizing the currency and eliminating exchange rate fluctuations, which facilitated consistent cross-fund comparisons. This careful selection and standardization process ensured the reliability and applicability of the research findings, aligning the dataset with the study's overarching goals (LSEG Datastream).

In financial studies, the risk-free interest rate is commonly utilized as a benchmark representing the return that an investor would expect from a risk-free investment. Typically, this rate is derived from Euribor rates, which represent the interbank lending rates within European financial institutions, or from the interest rates of debt securities issued by financially stable nations. These instruments are widely regarded as proxies for risk-free returns due to their low credit risk and high reliability (Kauppila et al., 2020, p. 142). This

study utilizes a risk-free rate of 0.84%, reflecting the average yield on Finnish 10-year benchmark government bonds over the period from November 1, 2014, to October 31, 2024 (Suomen Pankki, 1992).

This study does not account for the exit charges of the funds, as it is assumed that retail investors will continue to hold their investments in the funds for the foreseeable future. The purpose of this research is to assist individual investors in identifying the most suitable and profitable fund for their needs. Specifically, it provides insights for investors who may wish to reconsider their current fund allocation if their existing fund underperforms relative to their expectations and requirements.

6.2 Material

In the following sections, the cost structures of all the funds included in the study are presented in Tables 1, 2, and 3. The cost structure of a fund is crucial for the long-term returns of the investor, as both initial and ongoing fees directly affect the net asset value of the investments. The discussion of cost structures starts with funds investing in Europe, followed by funds focusing on Finland and finally funds investing in North America.

6.2.1 Europe

Table 1 presents the funds included in this research that invest in the European area. Funds marked with an asterisk (*) represent passive funds, while the remaining entries correspond to actively managed equity funds.

Table 1. Charges of Funds Investing in Europe.

Fund Name	Initial Charge	Ongoing Charge	Start Date	Market Area
Aktia Europe B	1,00 %	1,91 %	4/24/1998	Europe
Alandsbanken Europe Equity B	1,00 %	1,40 %	6/1/2001	Europe
Danske Invest Europe High Dividend G	1,00 %	1,75 %	9/16/2010	Europe
Danske Invest Europe Small Capital G	1,00 %	1,50 %	3/3/2011	Europe
Danske Invest European Equity G	1,00 %	1,35 %	10/12/2009	Europe
EQ Eurooppa Osinko 1 K	1,00 %	1,74 %	3/14/2008	Europe
EQ Europe Small Capital 1MONTH	1,00 %	1,75 %	8/25/2008	Europe
EQ Europe Stock Index 1 K*	0,00 %	0,50 %	7/6/2005	Europe
Evli Europe B	0,00 %	1,60 %	8/30/2000	Europe
Local Tapiola ESG Europe Mid Capital A	0,00 %	1,51 %	6/4/1999	Europe
Nordea European Passive Fund B Growth EUR*	0,00 %	0,50 %	2/25/2010	Europe
Nordea European Passive Fund I Growth EUR*	0,00 %	0,40 %	2/19/2009	Europe
Nordea European Stars Fund A Growth EUR	0,00 %	1,47 %	12/22/1999	Europe
Nordea European Smaller Companies Fund A Growth EUR	0,00 %	1,61 %	10/23/2013	Europe
OP-Europe Dividend Firm A	1,00 %	1,80 %	12/13/2012	Europe
OP-Europe Index A*	0,00 %	0,39 %	9/29/2011	Europe
OP-Europe Index II A*	0,15 %	0,20 %	4/23/1999	Europe
Pop Eurooppa B	1,00 %	1,92 %	2/1/2005	Europe
S-Bank Europe Equity Fund A	0,00 %	1,80 %	9/15/2010	Europe
Saastopankki Eurooppa B	1,00 %	1,97 %	5/13/2003	Europe
Seligson and Co Europe Index A*	0,10 %	0,46 %	6/15/1998	Europe
UB Europe Real Estate Equity A	1,00 %	1,32 %	2/24/2014	Europe
UB Europe Real Estate Equity K	1,00 %	0,82 %	5/10/2004	Europe

From Table 1, the initial charge varies across funds, with several passive funds (e.g., "EQ Europe Stock Index 1 K*") featuring no initial charge. This contrasts with actively managed funds, many of which have an initial charge of 1.00%. Similarly, ongoing charges also display a significant range, with passive funds generally exhibiting lower charges, such as the "Nordea European Passive Fund I Growth EUR*" with an ongoing charge of 0.40%. In comparison, actively managed funds often incur higher ongoing charges, as seen in "Aktia Europe B" with a rate of 1.91%.

6.2.2 Finland

Table 2 highlights the funds analyzed in this research that specifically focus on the Finnish market. As with the European funds in Table 1, passive funds are marked with an asterisk (*), while the remaining entries represent actively managed equity funds.

Table 2. Charges of Funds Investing in Finland.

Fund Name	Initial Charge	Ongoing Charge	Start Date	Market Area
Aktia Capital B	1,00 %	1,86 %	5/15/1992	Finland
Danske Invest Finnish Equity G	1,00 %	1,40 %	9/16/2010	Finland
EQ Finland 1 K	1,00 %	1,53 %	6/13/2007	Finland
Evli Finland Select B	0,00 %	1,80 %	9/15/2010	Finland
Evli Finnish Small Capital B	0,00 %	1,60 %	9/15/2010	Finland
Nordea Finnish Passive Fund B Growth EUR*	0,00 %	0,50 %	2/25/2010	Finland
Nordea Finnish Passive Fund I Growth EUR*	0,00 %	0,40 %	9/17/2008	Finland
Nordea Finnish Stars Fund A Growth EUR	0,00 %	1,39 %	1/18/1993	Finland
Nordea Pro Finland Fund I Growth EUR	0,00 %	0,50 %	3/10/1993	Finland
OP-Finland A	0,00 %	1,60 %	6/6/1994	Finland
OP-Finland Small Firm A	0,00 %	2,00 %	1/28/2002	Finland
Pop Suomi	1,00 %	1,87 %	2/1/2005	Finland
Saastopankki Kotimaa B	1,00 %	1,92 %	5/13/2003	Finland
Seligson and Co Finland Index A*	0,10 %	0,46 %	4/1/1998	Finland
UB Suomi A	1,00 %	1,58 %	2/24/2014	Finland
UB Suomi Kasvu	1,00 %	0,85 %	4/30/2004	Finland

The passive funds shown in Table 2, such as Seligson & Co Finland Index A* (0.46% ongoing charge, 0.10% initial charge) and Nordea Finnish Passive Fund I Growth EUR* (0.40% ongoing charge, 0.00% initial charge), offer significantly lower costs than actively managed funds.

In Table 2, Nordea Pro Finland Fund I Growth EUR stands out with an ongoing charge of 0.50%, which is comparable to the passively managed Nordea Finnish Passive Fund B Growth EUR*. This is unique, given actively managed funds normally have much higher management fees. Furthermore, Nordea Pro Finland Fund I Growth EUR does not have an initial fee, setting it apart from numerous other actively managed funds and putting it on level with passive funds in terms of cost structure.

The most expensive funds in Table 2 are OP-Finland Small Firm A (2.00% ongoing charge, 0% initial charge), Säästöpankki Kotimaa B (1.92% ongoing charge, 1.00% initial charge), POP Suomi (1.87% ongoing charge, 1.00% initial charge), and Aktia Capital B (1.86% ongoing charge, 1.00% initial charge). Of them, OP-Finland Small Firm A stands out as having the highest ongoing charge but no initial charge. Säästöpankki Kotimaa B, POP Suomi, and Aktia Capital B, on the other hand, have a large ongoing charge as well as an initial charge, which may make them less attractive to investors.

6.2.3 North America

Table 3 provides the investment funds employed in this study that invest in North American markets, the same as tables 1 and 2 do with Finnish and European funds. If the fund is passive, it is shown with an asterisk (*) after its name. The start date of the funds is also presented in the table.

Table 3. Charges of Funds Investing in North America.

Fund Name	Initial Charge	Ongoing Charge	Start Date	Market Area
AKTIA AMERICA B	1,00 %	1,89 %	11/28/2003	North America
DANSKE INVEST USA INDEX FUND G*	1,00 %	0,35 %	9/16/2010	North America
EQ USA INDEKSI 1 K*	0,00 %	0,38 %	7/6/2005	North America
LOCAL TAPIOLA ESG USA MID CAP A	0,00 %	1,61 %	5/2/2002	North America
NORDEA NTH AMERICAN DIV FD A GRO EUR	0,00 %	1,20 %	2/11/2002	North America
NORDEA NTH AMERICAN DIV FD I GRO EUR	0,00 %	1,20 %	11/15/2013	North America
OP-AMERICA INDEX A*	0,06 %	0,39 %	9/29/2011	North America
OP-AMERICA SMALL CAP A	1,00 %	1,90 %	7/8/2013	North America
OP-AMERICA VALUE COMPANIES FUND A	1,00 %	1,80 %	4/23/2014	North America
OP-AMERIKKA INDEKSI II A*	0,06 %	0,20 %	4/30/2002	North America
S-BANK USA EQUITY FUND A	0,00 %	1,50 %	1/4/1999	North America
SAASTOPANKKI AMERIKKA B	1,00 %	1,81 %	9/24/2010	North America
SELIGSON & CO NORTH AMERICA INDEX A*	0,10 %	0,46 %	12/29/2006	North America
UB AMERICAN EQUITY A	1,00 %	1,80 %	2/24/2014	North America
UB AMERICAN EQUITY K	1,00 %	0,98 %	12/31/2004	North America

Table 3 contains no unusual price solutions. The funds with the highest charges are Aktia America B (1.00% initial charge, 1.89% ongoing charge), OP-America Small Cap A (1.00% initial charge, 1.90% ongoing charge), OP-America Value Companies Fund A (1.00% initial charge, 1.80% ongoing charge), Saastopankki Amerikka B (1.00% initial charge, 1.81% ongoing charge) and UB American Equity A (1.00% initial charge, 1.80% ongoing charge).

The lowest-cost North American funds in Table 3 are all passively managed. For example, OP-America Index A* (0.39% ongoing charge, 0.06% initial charge), OP-America Index II A* (0.20% ongoing charge, 0.06% initial charge), and Seligson & Co North America Index A* (0.46% ongoing charge, 0.10% initial charge) are significantly lower in cost than the previously mentioned actively managed funds.

6.2.4 Benchmarks

Table 4 presents detailed information on the indices utilized for profit comparisons in this study. These indices serve as benchmarks to evaluate the performance of the funds under investigation, providing a basis for comparative analysis.

Table 4. Comparison Indices of the study.

Index	Market Area	Number of Companies	Year of Established
S&P 500 COMPOSITE	North America	503	1957
MSCI EUROPE	Europe	415	1986
OMX HELSINKI (OMXH)	Finland	139	1990

Table 4 shows the S&P 500 Composite fund, which is a benchmark for funds investing in North American markets in this study. At the same time, the MSCI Europe Index is for European funds, while the OMX Helsinki Index is for Finnish funds.

7 Results

The following chapter presents the performance analysis of the constituent funds and respective benchmark indices of the study. The analysis begins with the average annual returns and volatility of the funds, followed by the analysis of the Sharpe ratio, Information ratio, Treynor ratio, Jensen's alpha, beta coefficients, and R-squared values as key performance measures. Funds and indices are first presented and examined individually in this chapter. Then by region, using averages, and finally by weighted average for all funds and indices from this study.

All the results included in the tables in this chapter have been calculated by Microsoft Excel to make sure that all the results are accurate and coherent. The risk-adjusted figures are calculated based on the returns of the funds without considering the expenses.

7.1 Annual returns and volatilities from 2014 to 2024

7.1.1 Funds Investing in North America

The most profitable of the funds studied was the passively managed Seligson & CO North America Index A fund, which had an average net annual return of 8.92%. Similarly, the actively managed OP-America Value Companies Fund A was the worst performer, returning only 5.31% per year. This fund had one of the highest annual costs-% from all the funds investing in North America. When comparing actively managed funds and index funds, passive portfolio management proved to be more profitable on average. The net annual return was lower for all actively managed funds compared to index funds.

The S&P 500 Composite Index, which serves as a benchmark for North American markets, achieved a net annual return of 9.50%. None of the actively managed funds in the study managed to outperform the S&P 500 Composite index. For instance, the active fund Local Tapiola ESG USA Mid Cap A had an annual net return of 6.00%, which was 3.50

percentage points less profitable than the S&P 500. Even without costs, it would have been 1.89 percentage points less profitable on average.

Volatility was also higher in actively managed funds compared to passive funds. The most volatile fund was the actively managed OP-America Small Cap A, with a volatility of 18.24%, while the passively managed Nordea North American DIV Fund A Growth EUR and Nordea North American DIV Fund I Growth EUR had the lowest volatility at 14.34%. Active funds consistently showed higher volatility, with the three highest volatility values belonging to actively managed funds.

The results from North American market area clearly indicate that index funds were safer and more profitable on average compared to actively managed funds. While it is possible to achieve slightly higher profits by selecting the right active fund at the right time, the risk of selecting a less profitable or more volatile active fund remains significant. Based on the findings, index funds remain the most reliable choice for investors seeking consistent returns with lower risk.

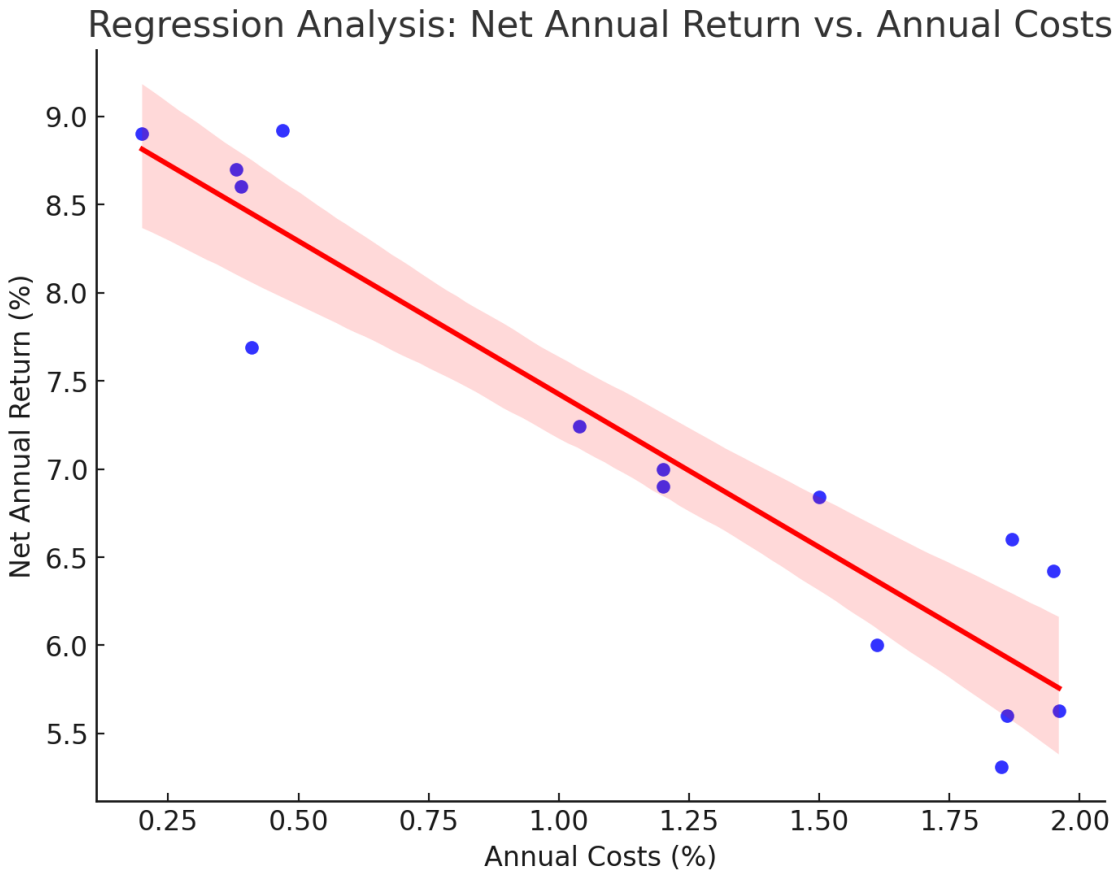

Figure 3. Regression Analysis North American Costs.

OLS regression analysis (Figure 3) shows that funds' Annual Costs and Net Annual Returns are strongly negatively correlated. The model's R-squared value is 0.876, which means that management costs explain 87.6% of the variation in the funds' net returns. This means that management fees are a significant factor in the long-term returns of funds.

According to the regression coefficient, each percentage point increase in annual management fees reduces the net return of the fund by 1.736 percentage points on average. This indicates that high management fees significantly erode the returns received by investors. The results are also statistically significant ($p < 0.001$), confirming that the relationship between management fees and net return is not random. The regression

analysis suggests that a retail investor would have been better off investing in passive funds in the North American market.

Table 5. OLS Regression Results.

OLS Regression Results Summary			
Area	**North America**	**Europe**	**Finland**
Statistic	Value	Value	Value
R-Squared	0.876	0.363	0.407
Intercept (constant)	9.160	5.520	6.427
Annual Costs Coefficient	-1.736	-1.088	-1.014
P-value (Annual Costs)	0.000	0.002	0.008
95% CI (Annual Costs)	[-2.127, -1.345]	[-1.743, -0.434]	[-1.716, -0.312]

7.1.2 Funds Investing in Europe

Comparing equity mutual funds investing in the European area by analyzing their compound annual growth rates, net annual returns, costs, and volatility. The benchmark used is the MSCI Europe Index. MSCI Europe Index gave a compound annual growth rate of 6.13%. Among the funds, the passively managed OP-Europe Index II A* had the highest net return in a year, 5.62% with the lowest annual cost, 0.21%. Correspondingly, other passive ones, like Nordea European Passive Fund I Growth EUR* and Nordea European Passive Fund B Growth EUR*, reached 5.34% and 5.13%, respectively, which is also cost-efficient.

Whereas passively managed funds were thus able to outperform the benchmark, actively managed funds were underperformers because of higher annual costs. Correspondingly, the Saastopankki Eurooppa B and the S-Bank Europe Equity Fund A obtained annual net returns of 4.36% and 2.83%, with their annual costs reaching up to 2.02% and 1.80%, respectively. Meanwhile, one of the worst-performing active funds, the Local Tapiola ESG Europe Mid Capital A, could only generate an annualised net return of 2.15% with costs of 1.51% per annum, much below the returns of passive funds and the benchmark. In addition, UB Europe Real Estate Equity A and UB Europe Real Estate Equity K

scored just 2.06% and 2.92%, respectively, as annualized net return while resulting in the biggest volatilities of 18.50% and 18.51%, respectively.

The risk measured by volatility was therefore still lower for the passives than the actives. For instance, the OP-Europe Index II A* and Seligson and Co Europe Index A* posted volatilities of 14.07% and 13.83% respectively, closely tracking that of the MSCI Europe Index at 14.03%, while many of the actives, like the Dankse Invest Europe Small Capital G, were highly volatile, with over 18% volatility, reflecting its higher risk.

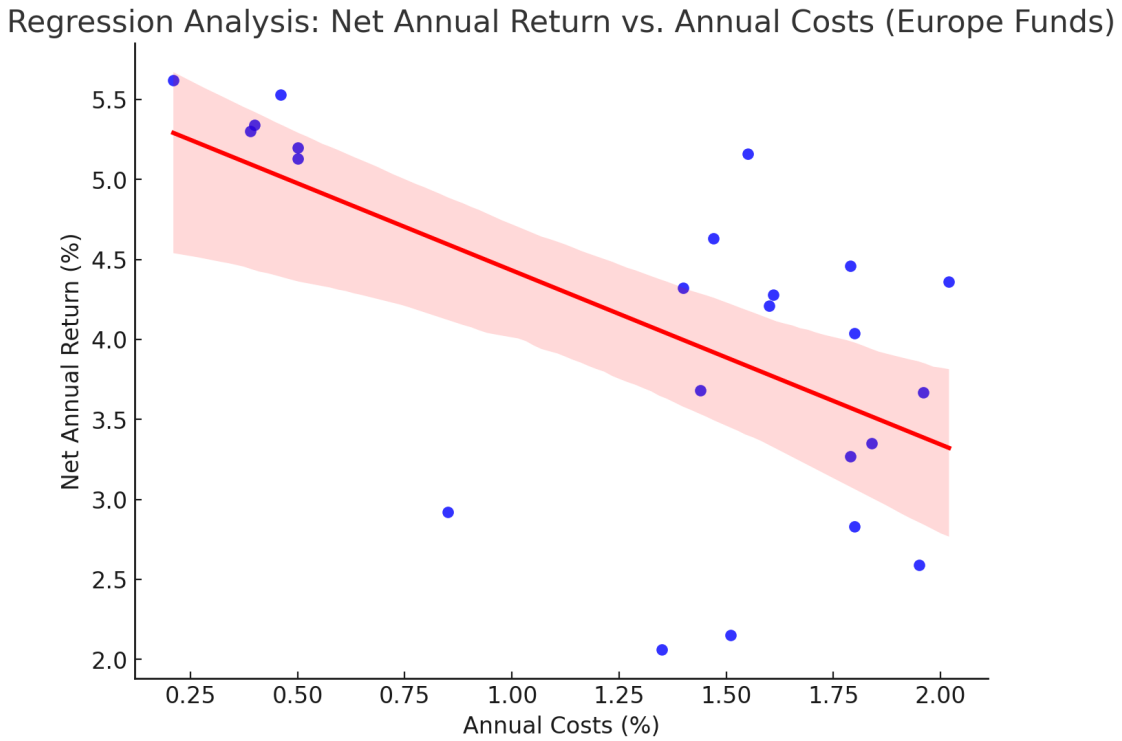

Figure 4. Regression Analysis European Costs.

The European OLS regression analysis (Figure 4) reveals a negative correlation between funds' annual costs and net annual returns. The model's R-squared value is 0.363, indicating that management costs account for 36.3% of the variation in fund net returns. This shows that management fees have a major impact on fund performance, although not as much as they do in North American markets.

According to the regression coefficient, each percentage point increase in annual management fees lowers a fund's net return by an average of 1.088 percentage points. The results are statistically significant ($p = 0.002$, $p < 0.05$), indicating that the relationship between management fees and net return is not random. Figure 4 shows that although the dispersion is more pronounced than in the analysis of funds investing in North America, the negative trend for Europe is also clear. For funds with annual charges above 1.50%, there was wide variation in net annual returns. Only the Danske Invest Europe Small Capital G (5.16%) active fund matched the return of the passive funds, despite high costs.

7.1.3 Funds Investing in Finland

Comparing mutual funds that invest in the Finnish market, including their compound annual growth rates, net annual returns, fees, and volatility. The benchmark for comparison is the OMX Helsinki (OMXH) Index, which has achieved a compound annual growth rate of 6.02%.

Among the funds, the passively managed Seligson & Co Finland Index A* had one of the highest net returns, at 6.31%, with a low annual cost of 0.47%. Other passive funds, including Nordea Finnish Passive Fund B Growth EUR* and Nordea Finnish Passive Fund I Growth EUR*, achieved net annual returns of 5.87% and 6.07%, respectively, while incurring low annual fees (0.40% and 0.50%).

EQ Finland 1 K is an interesting case, as it exhibited a compound annual growth rate of 7.19%, one of the highest in the Finland data set. However, after accounting for its rather high annual cost of 1.58%, the net return fell to 5.60%, placing it in the mid-tier of funds net annual returns. This highlights how even great annual gross gains are reduced due to high annual costs.

Additionally, Nordea Pro Finland Fund I Growth EUR, an actively managed fund, had annual fees of 0.50%, which is comparable with Nordea's passive funds. Despite this cost

advantage over other active funds, it failed to outperform Nordea's own passive alternatives, highlighting the difficulty that active management has in continuously producing excess returns relative to index investing strategies.

The risk, as defined by volatility, showed a clear distinction between active and passive funds. Many active funds had significantly higher volatility, particularly OP-Finland Small Firm A, which had the highest volatility at 18.08%. Meanwhile, The OMX Helsinki (OMXH) Index had a volatility of 14.80%.

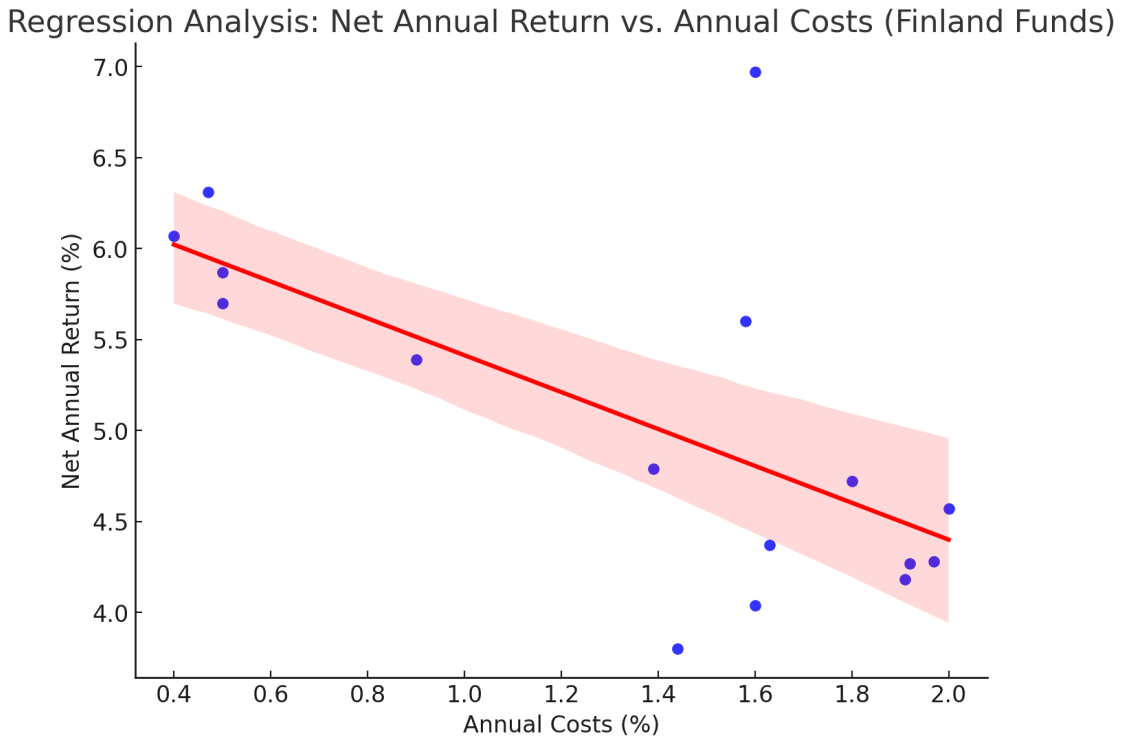

Figure 5. Regression Analysis Finland Funds Costs.

Regression analysis of Finnish mutual funds shows the trend of decreased annual costs resulting in higher net returns on average. The regression figure 5 shows a clear negative association between expenses and net returns, indicating that investors benefit from selecting funds with low fees. However, there was an exception to this pattern.

This one notable exception is Evli Finnish Small Capital B, a fund that invests in small companies and generated an exceptional net return of 6.97% despite having comparatively high annual fees of 1.60%. This shows that certain market segments, such as small-cap investments, can generate high returns even when costs are high. Still, the overall tendency is consistent: funds with the highest annual charges tend to underperform significantly.

7.2 Risk-adjusted returns from 2014 to 2024

Next, the risk-adjusted returns of the funds in each study area are examined using the return criteria presented in the previous chapters. First, funds investing in the North American market area, then funds investing in the European market area, and finally funds investing in the Finnish market area.

7.2.1 North America

Tables 6 and 7 provide a comprehensive examination of the performance and risk characteristics of mutual funds investing in the North American market area, comparing active and passive funds together, and in Table 6, mutual funds are compared as well to the S&P 500 Composite Index.

Table 6. North American calculations of Sharpe, Treynor, and Beta.

Mutual Fund	Management Style	Market Area	Sharpe	Treynor	Beta
AKTIA AMERICA B	Active	North America	0,4769	0,0641	1,17
DANSKE INVEST USA INDEX FUND G*	Passive	North America	0,4879	0,0663	1,09
EQ USA INDEKSI 1 K*	Passive	North America	0,5693	0,0806	1,02
LOCAL TAPIOLA ESG USA MID CAP A	Active	North America	0,4307	0,0631	1,07
NORDEA NTH AMERICAN DIV FD A GRO EUR	Active	North America	0,5135	0,0716	1,03
NORDEA NTH AMERICAN DIV FD I GRO EUR	Active	North America	0,5061	0,0700	1,04
OP-AMERICA INDEX A*	Passive	North America	0,5576	0,0786	1,04
OP-AMERICA SMALL CAP A	Active	North America	0,3700	0,0529	1,27
OP-AMERICA VALUE COMPANIES FUND A	Active	North America	0,4124	0,0554	1,14
OP-AMERIKKA INDEKSI II A*	Passive	North America	0,5649	0,0801	1,03
S-BANK USA EQUITY FUND A	Active	North America	0,5111	0,0706	1,06
SAASTOPANKKI AMERIKKA B	Active	North America	0,5059	0,0717	1,06
SELIGSON & CO NORTH AMERICA INDEX A*	Passive	North America	0,5785	0,0838	1,02
UB AMERICAN EQUITY A	Active	North America	0,4186	0,0576	1,15
UB AMERICAN EQUITY K	Active	North America	0,4638	0,0665	1,12
S&P 500 Composite	Index	North America	0,5976	0,0866	1,00

S-Bank USA Equity Fund A has the best risk-adjusted performance among actively managed funds, with a Sharpe ratio of 0.5111 and a Treynor ratio of 0.0706. Meanwhile, Seligson & Co North America Index A* outperforms with a Sharpe ratio of 0.5785 and a Treynor ratio of 0.0838, establishing it as the top passive investment option. In contrast, OP-America Small Cap A had the lowest Sharpe ratio (0.3700) and Treynor ratio (0.0529) of any fund, implying lower risk-adjusted returns. Additionally, OP-America Small Cap A had the highest beta coefficient (1.27), indicating a higher sensitivity to market volatility and risk exposure.

Table 7. North American calculations of IR, Jensen, and R-Squared.

Mutual Fund	Management Style	Market Area	IR	Jensen	R^2
AKTIA AMERICA B	Active	North America	-0,33	-0,026	0,956
DANSKE INVEST USA INDEX FUND G*	Passive	North America	-0,42	-0,022	0,943
EQ USA INDEKSI 1 K*	Passive	North America	-3,70	-0,006	1,000
LOCAL TAPIOLA ESG USA MID CAP A	Active	North America	-0,32	-0,025	0,889
NORDEA NTH AMERICAN DIV FD A GRO EUR	Active	North America	-0,25	-0,015	0,894
NORDEA NTH AMERICAN DIV FD I GRO EUR	Active	North America	-0,27	-0,017	0,893
OP-AMERICA INDEX A*	Passive	North America	-0,57	-0,008	0,996
OP-AMERICA SMALL CAP A	Active	North America	-0,22	-0,043	0,800
OP-AMERICA VALUE COMPANIES FUND A	Active	North America	-0,37	-0,036	0,869
OP-AMERIKKA INDEKSI II A*	Passive	North America	-0,44	-0,007	0,996
S-BANK USA EQUITY FUND A	Active	North America	-0,34	-0,017	0,936
SAASTOPANKKI AMERIKKA B	Active	North America	-0,25	-0,016	0,924
SELIGSON & CO NORTH AMERICA INDEX A*	Passive	North America	-0,02	-0,003	0,871
UB AMERICAN EQUITY A	Active	North America	-0,33	-0,033	0,796
UB AMERICAN EQUITY K	Active	North America	-0,20	-0,022	0,803

In Table 7, the Information Ratios (IR) across all funds are negative, reflecting difficulties outperforming the benchmark. For example, OP-America Small Cap A, an actively managed fund, records an IR value of -0.22. EQ USA Indeksi 1 K* had a R^2 value of exactly 1.000, meaning it perfectly tracked the benchmark, demonstrating it as a well-managed passive fund. However, it also had the most negative Information Ratio (-3.70), indicating significant difficulty in generating excess returns relative to the benchmark.

Jensen's Alpha, which evaluates a fund's excess return relative to its expected performance given its risk level, was highest for Seligson & Co North America Index A* (-0.003). Even though all mutual funds got negative Alpha, Seligson & Co North America Index A* was the closest fund to zero point. However, OP-America Small Cap A scored the lowest

(-0.043) Jensen's Alpha, indicating the worst excess return production among the funds analysed.

7.2.2 Europe

Tables 8 and 9 provide a comprehensive analysis of the performance and risk metrics of European mutual funds, highlighting differences between active and passive management strategies while comparing them to the MSCI Europe Index, which serves as the benchmark for the analysis. In Table 8, the MSCI Europe Index achieves the highest Sharpe ratio (0.3773). However, Nordea European Smaller Companies Fund A Growth EUR has the highest Treynor ratio (0.0689).

Table 8. Europe calculations of Sharpe, Treynor, and Beta.

Mutual Fund	Management Style	Market Area	Sharpe	Treynor	Beta
Aktia Europe B	Active	Europe	0,2454	0,0359	1,03
Alandsbanken Europe Equity B	Active	Europe	0,3032	0,0407	1,05
Danske Invest Europe High Dividend G	Active	Europe	0,3204	0,0446	0,95
Danske Invest Europe Small Capital G	Active	Europe	0,3221	0,0665	0,88
Danske Invest European Equity G	Active	Europe	0,3590	0,0525	0,93
EQ Eurooppa Osinko 1 K	Active	Europe	0,2940	0,0474	1,14
EQ Europe Small Capital 1MONTH	Active	Europe	0,2760	0,0514	0,97
EQ Europe Stock Index 1 K*	Passive	Europe	0,3465	0,0475	1,02
Evli Europe B	Active	Europe	0,2877	0,0450	1,11
Local Tapiola ESG Europe Mid Capital A	Active	Europe	0,1885	0,0266	1,06
Nordea European Passive Fund B Growth EUR*	Passive	Europe	0,3327	0,0456	1,05
Nordea European Passive Fund I Growth EUR*	Passive	Europe	0,3404	0,0471	1,04
Nordea European Stars Fund A Growth EUR	Active	Europe	0,3416	0,0504	1,04
Nordea European Smaller Companies Fund A Growth EUR	Active	Europe	0,3593	0,0689	0,73
OP-Europe Dividend Firm A	Active	Europe	0,3161	0,0435	1,00
OP-Europe Index A*	Passive	Europe	0,3443	0,0469	1,03
OP-Europe Index II A*	Passive	Europe	0,3545	0,0488	1,02
Pop Eurooppa B	Active	Europe	0,2880	0,0415	1,15
S-Bank Europe Equity Fund A	Active	Europe	0,2705	0,0354	1,07
Saastopankki Eurooppa B	Active	Europe	0,3335	0,0529	1,05
Seligson and Co Europe Index A*	Passive	Europe	0,3726	0,0530	0,97
UB Europe Real Estate Equity A	Active	Europe	0,1387	0,0251	1,02
UB Europe Real Estate Equity K	Active	Europe	0,1583	0,0291	1,00
MSCI EUROPE	Index	Europe	0,3773	0,0529	1,00

Among the actively managed funds, Danske Invest European Equity G stands out with competitive results, achieving a Sharpe ratio of 0.3590 and a Treynor ratio of 0.0525. These values place it close to the benchmark, suggesting strong performance with relatively lower deviations. Conversely, funds such as UB Europe Real Estate Equity A perform poorly, with the lowest Sharpe ratio (0.1387) and Treynor ratio (0.0251), indicating weak risk-adjusted returns and less efficient management.

Table 9. European calculations of IR, Jensen, and R-Squared.

Mutual Fund	Management Style	Market Area	IR	Jensen	R^2
Aktia Europe B	Active	Europe	-0,40	-0,0175	0,928
Alandsbanken Europe Equity B	Active	Europe	-0,38	-0,0128	0,960
Danske Invest Europe High Dividend G	Active	Europe	-0,22	-0,0079	0,894
Danske Invest Europe Small Capital G	Active	Europe	0,05	0,0120	0,662
Danske Invest European Equity G	Active	Europe	-0,10	-0,0004	0,916
EQ Eurooppa Osinko 1 K	Active	Europe	0,02	-0,0063	0,844
EQ Europe Small Capital 1MONTH	Active	Europe	-0,03	-0,0015	0,676
EQ Europe Stock Index 1 K*	Passive	Europe	-1,47	-0,0056	0,999
Evli Europe B	Active	Europe	-0,05	-0,0088	0,869
Local Tapiola ESG Europe Mid Capital A	Active	Europe	-0,48	-0,0280	0,880
Nordea European Passive Fund B Growth EUR*	Passive	Europe	-0,27	-0,0076	0,983
Nordea European Passive Fund I Growth EUR*	Passive	Europe	-0,21	-0,0061	0,983
Nordea European Stars Fund A Growth EUR	Active	Europe	-0,01	-0,0026	0,923
Nordea European Smaller Companies Fund A Growth EUR	Active	Europe	-0,03	0,0117	0,752
OP-Europe Dividend Firm A	Active	Europe	-0,36	-0,0095	0,957
OP-Europe Index A*	Passive	Europe	-0,61	-0,0062	0,998
OP-Europe Index II A*	Passive	Europe	-0,42	-0,0043	0,998
Pop Eurooppa B	Active	Europe	-0,10	-0,0131	0,923
S-Bank Europe Equity Fund A	Active	Europe	-0,79	-0,0187	0,978
Saastopankki Eurooppa B	Active	Europe	0,04	-0,0001	0,900
Seligson and Co Europe Index A*	Passive	Europe	-0,04	0,0001	0,947
UB Europe Real Estate Equity A	Active	Europe	-0,24	-0,0285	0,603
UB Europe Real Estate Equity K	Active	Europe	-0,21	-0,0239	0,607

Table 9 further evaluates the funds' excess returns and alignment with the benchmark. Passively managed funds, such as Seligson and Co Eurooppa Index A*, exhibit strong alignment with the index, achieving a high R^2 value (0.947) and the greatest Information Ratio (-0.04) of all the passive funds, indicating efficient tracking of market performance.

7.2.3 Finland

Table 10 highlights risk-adjusted returns through Sharpe and Treynor ratios, as well as Beta values, while Table 11 offers additional insights into excess returns using Information Ratio (IR), Jensen's alpha, and the degree of market alignment through R^2 values.

Table 10. Finland calculations of Sharpe, Treynor, and Beta.

Mutual Fund	Management Style	Market Area	Sharpe	Treynor	Beta
Aktia Capital B	Active	Finland	0,3218	0,0514	1,02
Danske Invest Finnish Equity G	Active	Finland	0,2710	0,0410	1,07
EQ Finland 1 K	Active	Finland	0,3872	0,0633	1,00
Evli Finland Select B	Active	Finland	0,3815	0,0604	0,94
Evli Finnish Small Capital B	Active	Finland	0,4337	0,0871	0,89
Nordea Finnish Passive Fund B Growth EUR*	Passive	Finland	0,3559	0,0545	1,01
Nordea Finnish Passive Fund I Growth EUR*	Passive	Finland	0,3628	0,0559	1,01
Nordea Finnish Stars Fund A Growth EUR	Active	Finland	0,3425	0,0527	1,01
Nordea Pro Finland Fund I Growth EUR	Active	Finland	0,3441	0,0521	1,03
OP-Finland A	Active	Finland	0,3076	0,0470	1,02
OP-Finland Small Firm A	Active	Finland	0,3167	0,0582	0,98
Pop Suomi	Active	Finland	0,3340	0,0519	1,03
Saastopankki Kotimaa B	Active	Finland	0,3400	0,0526	1,03
Seligson and Co Finland Index A*	Passive	Finland	0,3766	0,0594	1,00
UB Suomi A	Active	Finland	0,3294	0,0525	0,98
UB Suomi Kasvu	Active	Finland	0,3479	0,0560	0,97
OMX HELSINKI (OMXH)	Index	Finland	0,3500	0,0518	1,00

Among the active funds, Evli Finnish Small Capital B consistently stands out, achieving the highest Sharpe ratio (0.4337) and Jensen's alpha (0.0313), indicating superior risk-adjusted and excess returns relative to its Beta. This fund also exhibits a Beta of 0.89, demonstrating lower market sensitivity and volatility compared to other active funds. However, its lower R^2 value (0.789) in Table 11 suggests a greater deviation from the benchmark, reflecting a more idiosyncratic investment approach. In contrast, Danske Invest Finnish Equity G performed poorly, with a negative Jensen's alpha (-0.0116) and relatively low risk-adjusted returns, as evidenced by its Sharpe ratio (0.2710).

Table 11. Finland calculations of IR, Jensen, and R-Squared.

Mutual Fund	Management Style	Market Area	IR	Jensen	R^2
Aktia Capital B	Active	Finland	0,012	-0,0004	0,893
Danske Invest Finnish Equity G	Active	Finland	-0,196	-0,0116	0,935
EQ Finland 1 K	Active	Finland	0,309	0,0115	0,950
Evli Finland Select B	Active	Finland	0,147	0,0081	0,951
Evli Finnish Small Capital B	Active	Finland	0,296	0,0313	0,789
Nordea Finnish Passive Fund B Growth EUR*	Passive	Finland	0,128	0,0027	0,969
Nordea Finnish Passive Fund I Growth EUR*	Passive	Finland	0,168	0,0042	0,969
Nordea Finnish Stars Fund A Growth EUR	Active	Finland	0,038	0,0009	0,929
Nordea Pro Finland Fund I Growth EUR	Active	Finland	0,059	0,0004	0,960
OP-Finland A	Active	Finland	-0,101	-0,0049	0,936
OP-Finland Small Firm A	Active	Finland	0,066	0,0064	0,795
Pop Suomi	Active	Finland	0,037	0,0001	0,909
Saastopankki Kotimaa B	Active	Finland	0,065	0,0008	0,943
Seligson and Co Finland Index A*	Passive	Finland	0,239	0,0076	0,957
UB Suomi A	Active	Finland	-0,005	0,0007	0,910
UB Suomi Kasvu	Active	Finland	0,057	0,0041	0,911

Passive funds, particularly Seligson and Co Finland Index A* and Nordea Finnish Passive Fund I Growth EUR*, showed strong alignment with market benchmarks, as indicated by their high R^2 values (0.957 and 0.969, respectively). While their Sharpe ratios (0.3766 and 0.3628) and Jensen's alphas (0.0076 and 0.0042) were slightly lower than the top-performing active funds, they offered consistent and reliable returns with minimal deviation from market performance. The EQ Finland 1 K fund demonstrated the highest Information Ratio (0.309) in Table 11, indicating exceptional efficiency in generating returns above the benchmark, further supported by its competitive Sharpe ratio (0.3872) in Table 10.

The results highlight a clear trade-off between active and passive management. While active funds such as Evli Finnish Small Capital B can deliver higher risk-adjusted and excess returns, they come with greater variability and risk due to their lower market alignment. Conversely, passive funds like Seligson and Co Finland Index A* offer stable and predictable performance closely aligned with market benchmarks. For investors, the choice between active and passive management should be guided by their risk tolerance, return expectations, and preference for stability versus potential outperformance.

7.3 Comparison of active and passive annual returns by market areas

Figure 6. Average annual returns of the funds in Finnish market area.

Figure 6 shows how active funds outperformed passive funds in the Finnish market compared to other nations before costs during the financial turmoil 2019-2024. Including fees, active funds lose out to passive funds, even though the average return of active funds (6.15%) is nearly equal to the return of the OMXH 25 index (6.85%).

Mutual funds that invest in Finland outperformed the OMX Helsinki benchmark index on average each year, before expenses. This shows that active portfolio management in the Finnish market provided higher gross returns than the market index. However, it is crucial to note as in Figure 6 that when expenses like management fees and other charges are factored in, these funds' net returns are lower than the benchmark index. This emphasizes the significance of expenses in determining the genuine efficacy of active funds in beating benchmark indexes or passive funds.

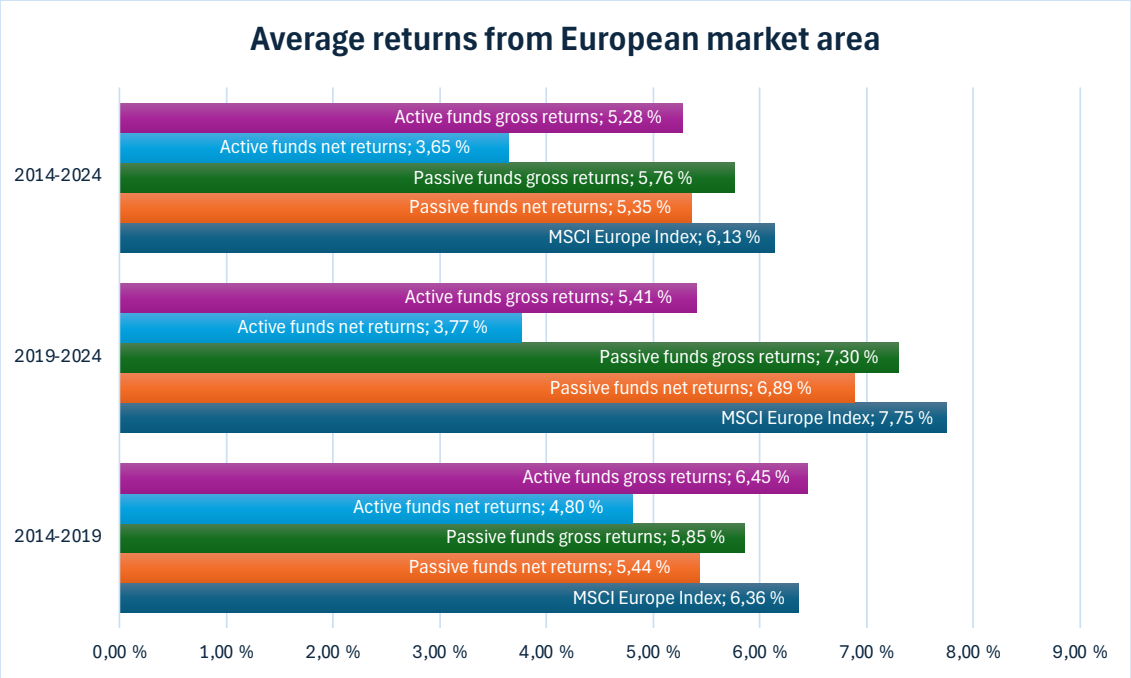

Figure 7. Average returns from European market.

Figure 7 above shows that for funds investing in Europe, it is impossible to see the same performance of active funds over the 2019-2024 period as observed for funds investing in the Finnish market in Figure 6. Active funds in the European market performed better on average per year over the 2014-2019 period than over the financial turmoil 2019-2024 period.

Figure 7 shows how active funds beat passive funds in the European market from 2014 to 2019, but after costs, active funds were surpassed by passive funds. Also, Figure 7 shows that in the European region, an active fund can be profitable for investors between 2014 and 2019, although the fund's charges must be carefully examined. During the financial turmoil period, the average net return between passive and active funds was a whopping 3.12% in favor of passive funds.

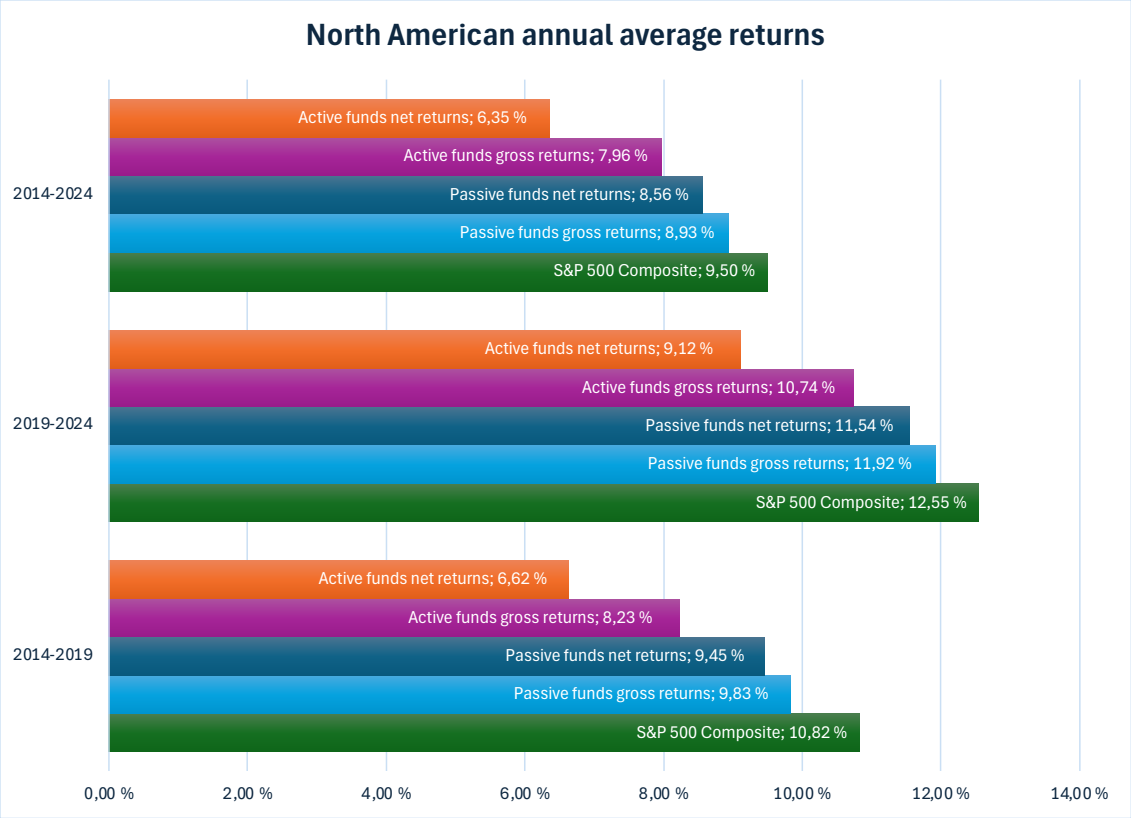

Figure 8. North American annual average returns.

In funds investing in North American markets (Figure 8), active funds lose out in each period. Active funds as well as passive funds and the index returned more during the 2019-2024 financial turmoil than during the 2014-2019 period. In a North American region comparison, passive funds on average beat even the gross performance of active funds in terms of net returns. This may be due to closet indexation of active funds or the uncertain knowledge of North American markets by active fund managers.

7.4 Weighted average performance comparison of active and passive funds

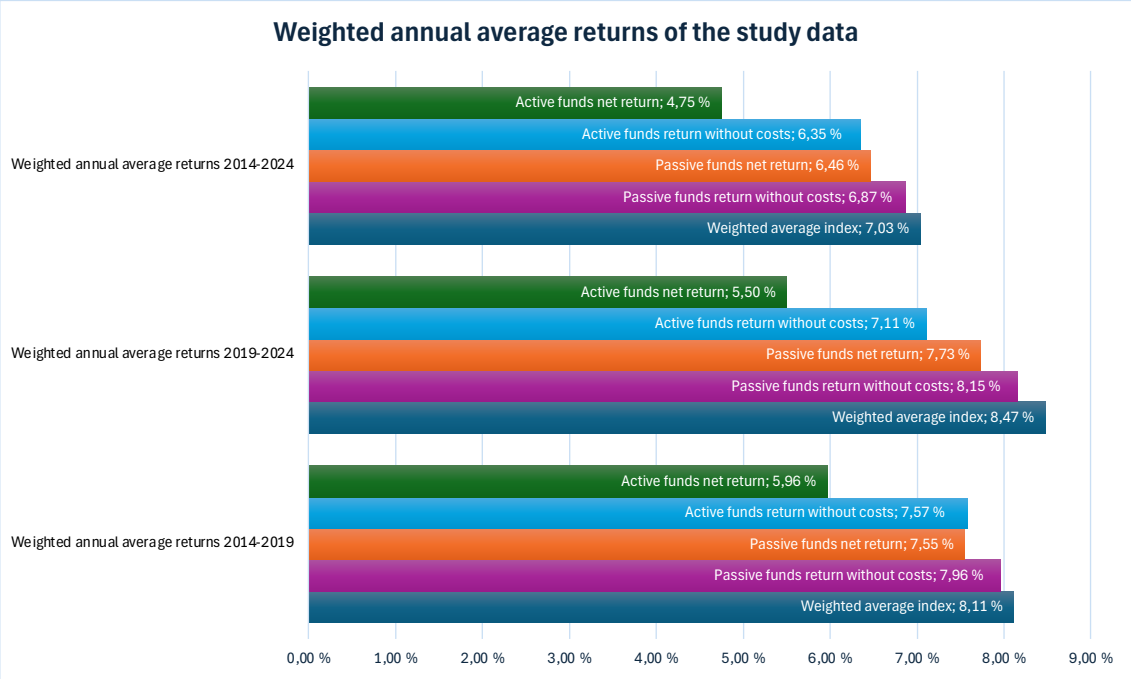

Figure 9. Weighted annual average returns of all the funds in study.

Figure 9 presents the results of the weighted averages of all 54 funds and three indices. The findings indicate that active funds significantly underperform compared to passive funds and indices, especially when all costs are factored in. Additionally, the study shows that active funds did not exceed the performance of passive funds when fees were considered. During the financial turmoil from 2019 to 2024, the average annual performance of indices and passive funds improved compared to the period from 2014 to 2019, while active funds performed worse during the financial turmoil of 2019 to 2024 than in the previous years.

Active funds only outperformed passive funds in the 2019-2024 period in the Finnish market in terms of average annual value and excluding expenses. Including expenses, active funds also lost to passive funds in the Finnish market. This result might be affected

by the low number of passive funds in the Finnish market, as there were only 3 in total, as showed also in the previous chapters.

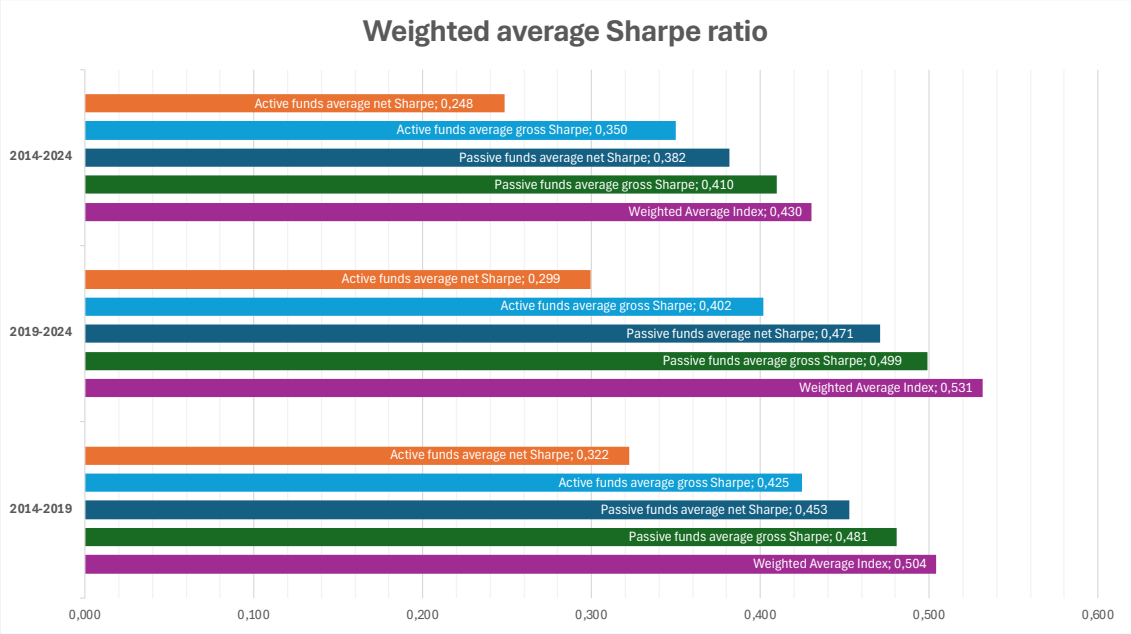

Figure 10. Weighted averages of Sharpe ratios.

Weighted average Sharpe ratios, as presented in Figure 10, reveals the consistent outperformance of passive funds overactive funds across the periods 2014–2019, 2019–2024, and 2014–2024. Passive funds achieved higher net and gross Sharpe ratios in all periods, demonstrating superior risk-adjusted returns and cost efficiency. While delivering competitive gross returns, active funds were significantly hindered by management fees, resulting in lower net Sharpe ratios. The index benchmark maintained the highest Sharpe ratios across all periods, highlighting its resilience and efficiency as a performance standard. These findings, illustrated in Figure 10, emphasize the value of passive strategies for investors seeking stable, cost-effective returns, particularly during volatile market conditions.

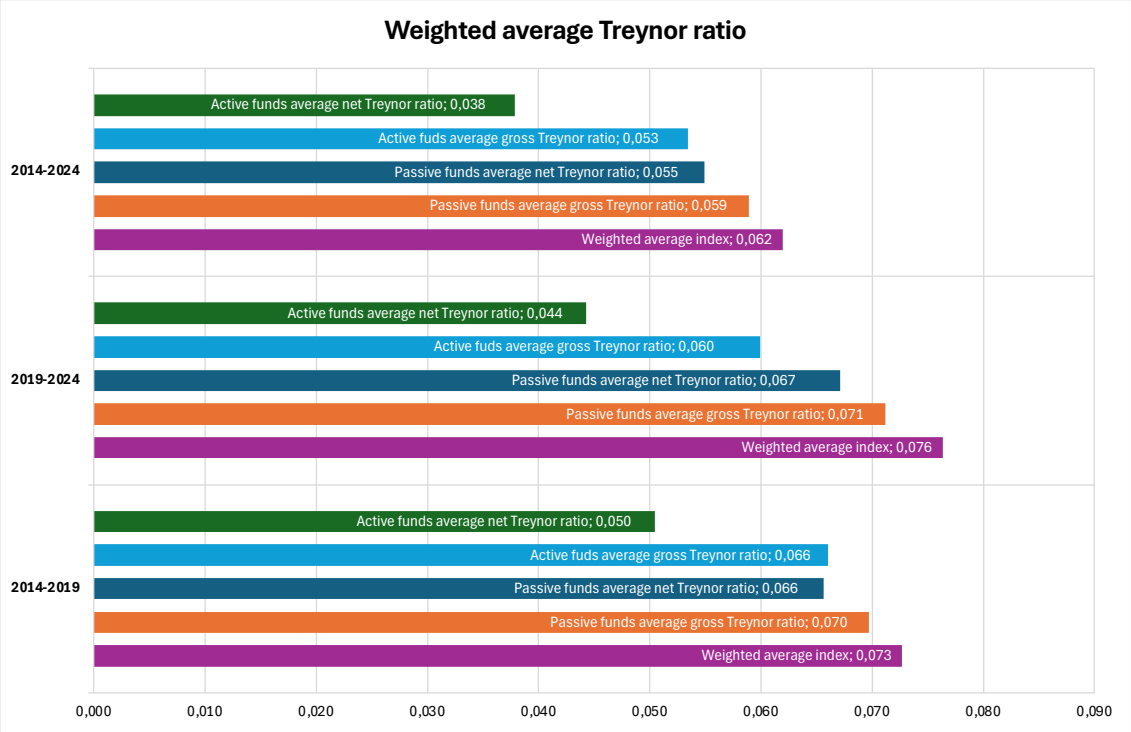

Figure 11. Weighted averages of Treynor ratios.

Figure 11, which presents the weighted average Treynor ratios for active funds, passive funds, and index benchmarks across the periods 2014–2019, 2019–2024, and 2014–2024, highlights the superior performance of passive funds relative to active funds. Passive funds consistently achieved higher Treynor ratios in both net and gross terms across all periods, reflecting their ability to generate higher risk-adjusted returns per unit of systematic risk. Active funds, while competitive in gross performance, were hindered by higher costs, leading to significantly lower net Treynor ratios.

The weighted average index Treynor ratio remained the highest across all periods, demonstrating the benchmark's efficiency and resilience in risk-adjusted performance. Notably, during the financial turmoil 2019–2024 period, a time of increased market volatility, the performance gap between passive and active funds widened further, emphasizing the cost-efficiency and stability of passive strategies in turbulent markets. These findings reinforce the effectiveness of passive investment strategies for managing systematic risk while maximizing returns, as illustrated in Figure 11.

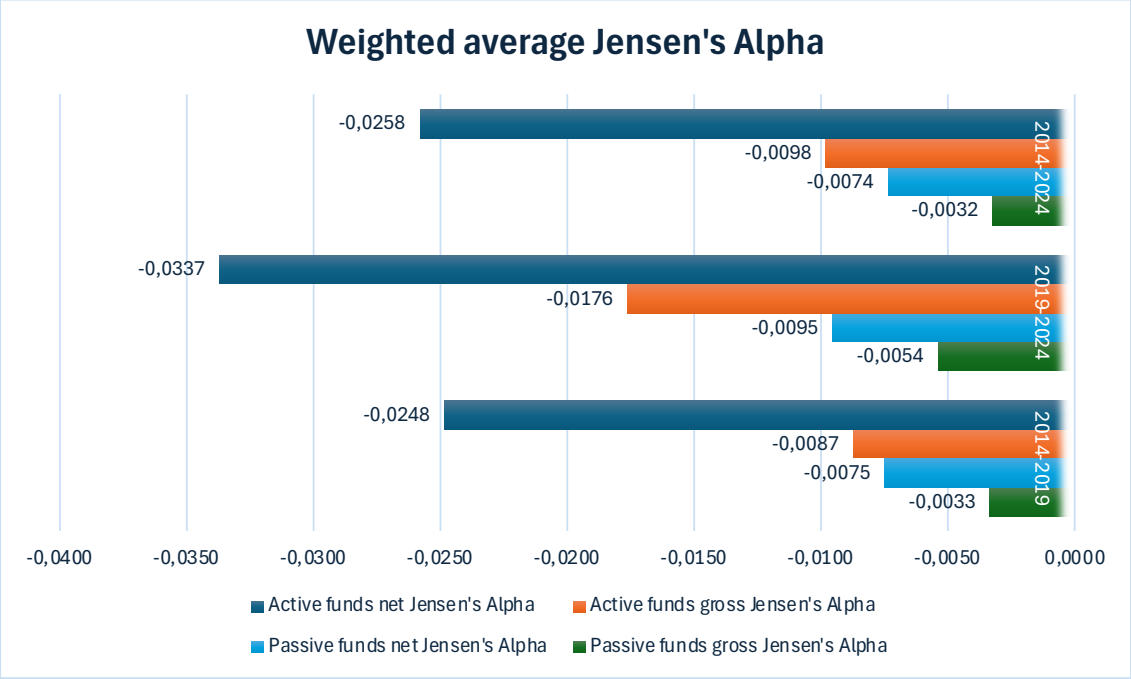

Figure 12. Weighted averages of Jensen's Alpha.

Figure 12 illustrates the weighted average Jensen's Alpha for active funds, passive funds, and their respective net and gross performances across the periods 2014–2019, 2019–2024, and 2014–2024. The negative Jensen's Alpha values in Figure 12 suggest that neither active nor passive funds were able to outperform the benchmark on a risk-adjusted basis during the periods analyzed. However, passive funds consistently delivered smaller negative Alphas, reflecting better cost-efficiency and closer alignment with market performance. The findings highlight the significant role of management costs in diminishing the excess returns of active funds, particularly in volatile market conditions in the financial turmoil period 2019–2024. These results further emphasize the challenges of achieving consistent excess returns through active fund management.

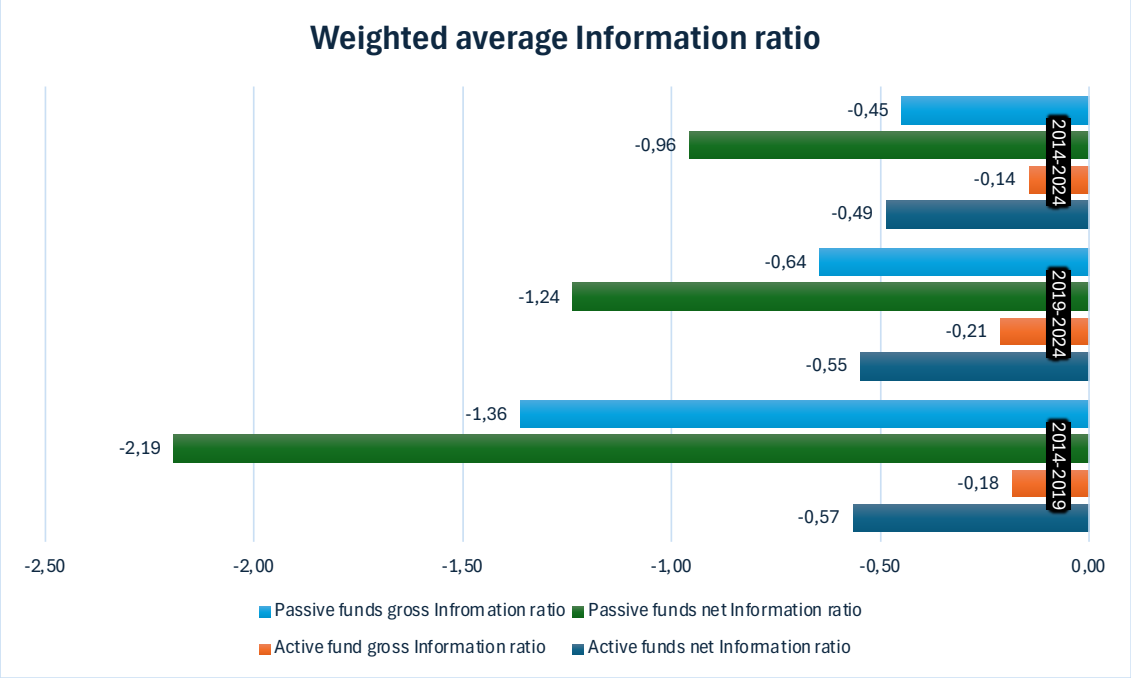

Figure 13. Weighted averages of Information ratios.

Figure 13 illustrates the weighted average Information Ratios (IR) of active and passive funds across the periods 2014–2019, 2019–2024, and 2014–2024, highlighting the relative performance of each fund type in terms of risk-adjusted excess returns. The results demonstrate that active funds consistently outperformed passive funds in all examined periods, showcasing their ability to generate superior risk-adjusted returns relative to the benchmark.

When analyzing the performance of passive funds over the periods 2014–2019 and 2019–2024, Figure 13 highlights a notable improvement in their Information Ratios (IR) during the 2019–2024 period. Although passive funds consistently underperformed active funds across all timeframes in Information ratios, their risk-adjusted returns improved significantly between the two periods, indicating better alignment with benchmark performance and enhanced cost-efficiency during financial turmoil.

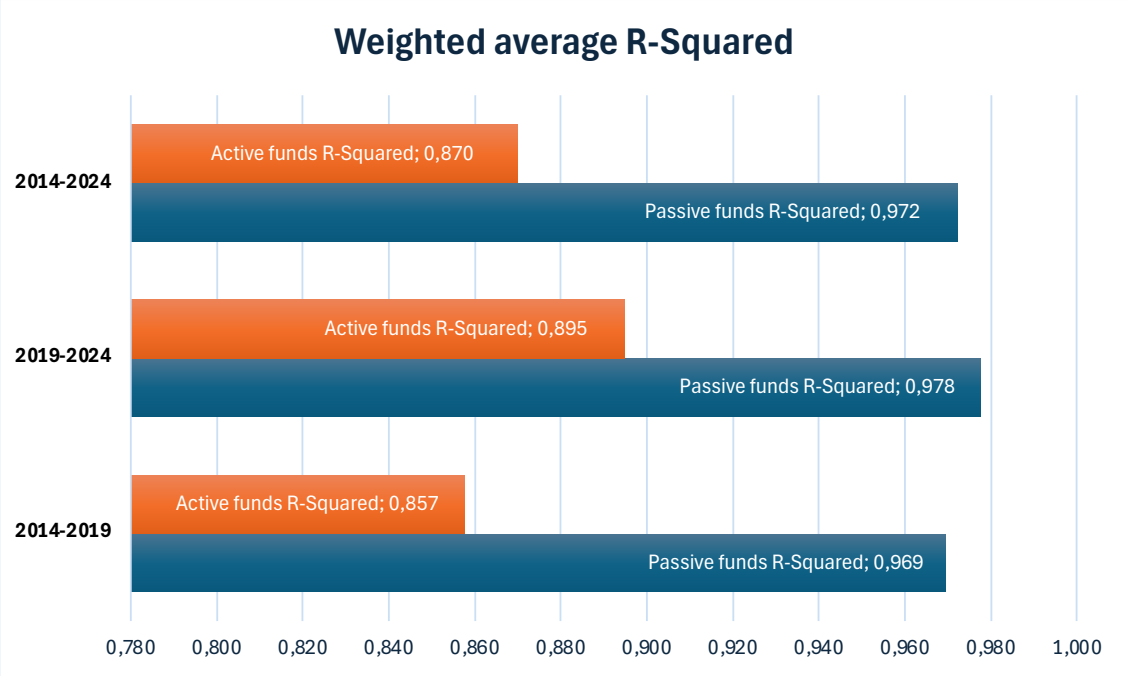

Figure 14. Weighted averages of R-squared.

The findings in Figure 14 underscore the superior benchmark-tracking ability of passive funds, as evidenced by their consistently higher R-squared values across all periods. While active funds showed improved alignment with benchmarks during the 2019–2024 period, their lower R-squared values reflect their inherent strategy of deviating from the index to pursue excess returns. These results highlight the fundamental trade-off between the predictability of passive funds and the potential, albeit riskier, outperformance of active funds. The observed trends reaffirm the cost-efficiency and reliability of passive funds for investors seeking close alignment with benchmark performance.

8 Conclusions

The study examined the performance, profitability, and cost-effectiveness of active and passive mutual funds accessible to retail investors over the 10 years from 2014 to 2024. The primary focus was on the relationship between fund returns and management costs, as well as the performance of these funds during distinct economic conditions, including financial turmoil from 2019 to 2024. By employing key performance metrics such as Sharpe ratio, Treynor ratio, Jensen's alpha, Information ratio, and R-squared values, the study offered an in-depth analysis of the trade-offs inherent in active versus passive fund management strategies. The dataset comprised 54 investment funds, including 14 index funds and 40 actively managed funds, across Finnish, European, and North American markets, benchmarked against the OMX Helsinki, MSCI Europe, and S&P 500 indices.

Passive funds consistently outperformed active funds in terms of net returns across all analyzed regions and periods. Despite occasional higher gross returns observed for active funds, their elevated management costs significantly eroded net performance. For instance, passive funds investing in Europe achieved higher Sharpe and Treynor ratios than their active counterparts, demonstrating superior risk-adjusted returns and cost efficiency. This trend was particularly pronounced during the financial turmoil of 2019–2024, when passive funds achieved higher weighted averages in most performance measures, reflecting their stability during volatile market conditions.

In the North American market, none of the actively managed funds in the study managed to outperform the S&P 500 Composite index. Passive funds, such as the Seligson & Co North America Index A fund, achieved the highest net returns with significantly lower volatility. Similarly, in the European market, the passively managed OP-Europe Index II A* achieved a net annual return of 5.62%, outperforming all active funds.

The study highlighted the critical impact of management fees on the net returns of active funds. Across all markets, active funds incurred higher management fees, which often

negated any outperformance achieved through active decision-making. For instance, in the Finnish market, while some active funds achieved gross returns exceeding those of passive funds, their net returns fell below the benchmark OMX Helsinki index once costs were included. This underscored the importance of cost-efficiency for retail investors.

Risk-adjusted performance, as measured by Sharpe and Treynor ratios, consistently favoured passive funds across all periods. Figure 10 demonstrated that passive funds achieved higher weighted average Sharpe ratios, reflecting superior risk-adjusted returns relative to their active counterparts. The S&P 500 Composite Index maintained the highest Sharpe and Treynor ratios, highlighting its efficiency as a benchmark for investment performance. Similarly, the weighted average R-squared values in Figure 14 underscored the superior benchmark-tracking ability of passive funds, while active funds exhibited lower R-squared values, reflecting their strategy of deviating from benchmarks to pursue excess returns.

Actively managed funds in North America, Europe, and Finland have generally underperformed passive funds in terms of risk-adjusted returns and net performance. Regression analysis reveals that higher yearly expenses correlate negatively with net annual returns, implying that actively managed funds, which typically charge higher fees, struggle to generate excess returns that justify their expenditures. Furthermore, passive funds consistently showed better alignment with their respective benchmarks, achieving higher R^2 values and demonstrating efficient market tracking.

Although certain active funds, such as Evli Finnish Small Capital B, achieved competitive returns, these were exceptions rather than the norm. Overall, the research suggests that passive funds produce higher long-term performance for investors by lowering expenses and reducing the risk of underperformance.

The financial turmoil period from 2019 to 2024, characterized by heightened market volatility due to events such as the COVID-19 pandemic and geopolitical tensions, offered

valuable insights into the resilience of active and passive funds. During this period, passive funds demonstrated greater stability and superior net performance compared to active funds. The average net return difference between passive funds widened significantly, with passive funds achieving a weighted average Information Ratio of (2014-2019) -2.19 and (2019-2024) -1.24 compared to (2014-2019) -0.57 and (2019-2024) -0.55 for active funds, as shown in Figure 13. These results highlighted the cost-efficiency and predictability of passive strategies during periods of market instability.

The study revealed significant regional differences in fund performance. In the Finnish market, active funds sometimes outperformed passive funds in terms of gross return, reflecting the local expertise of active fund managers. However, when expenses were considered, passive funds consistently outperformed active funds, highlighting the importance of cost considerations in determining net returns. In contrast, passive funds performed better in European and North American markets, where active funds often failed to consistently outperform their benchmark index.

The findings of this study emphasized the importance of aligning investment strategies with individual goals, risk tolerance, and cost considerations. While active funds occasionally delivered higher gross returns, their elevated costs often eroded net performance, making passive funds a more reliable choice for cost-conscious investors seeking stable, predictable returns. This was particularly evident during the financial turmoil period with high market volatility, where passive funds demonstrated resilience and superior risk-adjusted performance.

The results showed that passive funds offer retail investors a cost-effective and efficient way to achieve market-oriented returns, especially in European and North American markets. However, active funds can still be attractive to investors seeking higher returns in specific markets, such as Finland, where local expertise can provide an advantage. Active funds could also be profitable for short-term investing. However, careful

consideration of management costs and risk-adjusted returns was essential to ensure optimal investment outcomes.

The findings show that for the majority of individual investors, investment in actively managed funds is not cost effective. The regression analysis of mutual funds reveals a strong negative relationship between costs and net returns, supporting the theory that higher fees reduce the fund's total return.

While some actively managed funds in Finland, such as Nordea Pro Finland Fund I Growth EUR, attempted to keep expenses down, they were unable to outperform their passive peers. Furthermore, many of the highest-cost funds produced among the lowest net returns, supporting the case for passive funding. Given that index funds and ETFs provide lower-cost access to market returns with more effective long-term performance, a typical retail investor would likely prefer passive funds over active alternatives.

During the financial turmoil of 2019–2024, which included the COVID-19 pandemic, inflationary pressures, and geopolitical instability, active funds were expected to take advantage of market inefficiencies and volatility. However, the study reveals that passive funds still held a strong performance advantage overall. While some active funds managed to navigate the crisis successfully, particularly those focused on specific market segments (such as small-cap funds), the majority of actively managed funds failed to consistently outperform passive funds even in volatile periods.

This suggests that while active management has the potential to adjust dynamically to market conditions, it does not guarantee better returns compared to passive investment strategies. The high costs associated with active funds further erode any short-term advantages they might have during turbulent market conditions. Thus, for long-term investors, passive equity funds remain the more reliable option, even during financial turmoil.

In conclusion, the study found that passive funds consistently outperformed active funds regarding cost efficiency, risk-adjusted returns, and alignment with benchmark performance. While active funds occasionally offered opportunities for outperformance in specific contexts, their higher costs and inherent risks made them less favorable for the average retail investor. These findings underscored the value of passive funds as a reliable, cost-effective investment option for achieving long-term financial goals.

A future study could examine short-term net returns of active fund investments. Differences in net returns between different market areas could also be studied, such as funds investing in Asia and the Middle East. The anomaly of investing in small-cap funds during financial turmoil could also be investigated. A future study could also compare the net returns of ETFs in addition to active and passive funds.

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Appendices

Appendix 1. List of sample funds investing in North America

AKTIA AMERICA B

DANSKE INVEST USA INDEX FUND G

EQ USA INDEKSI 1 K

LOCAL TAPIOLA ESG USA MID CAP A

NORDEA NTH AMERICAN DIV FD A GRO EUR

NORDEA NTH AMERICAN DIV FD I GRO EUR

OP-AMERICA INDEX A

OP-AMERICA SMALL CAP A

OP-AMERICA VALUE COMPANIES FUND A

OP-AMERIKKA INDEKSI II A

S-BANK USA EQUITY FUND A

SAASTOPANKKI AMERIKKA B

SELIGSON & CO NORTH AMERICA INDEX A

UB AMERICAN EQUITY A

UB AMERICAN EQUITY K

Appendix 2. List of sample funds investing in Europe

AKTIA EUROPE B

ALANDSBANKEN EUROPE EQUITY B

DANSKE INVEST EUROPE HIGH DIVIDEND G

DANSKE INVEST EUROPE SMALL CAP G

DANSKE INVEST EUROPEAN EQUITY G

EQ EUROOPPA OSINKO 1 K

EQ EUROPE SMALL CAP 1MONTH

EQ EUROPE STOCK INDEX 1 K

EVLI EUROPE B

LOCAL TAPIOLA ESG EUROPE MID CAP A

NORDEA EUROPEAN PASSIVE FUND B GROWTH EUR

NORDEA EUROPEAN PASSIVE FUND I GROWTH EUR

NORDEA EUROPEAN STARS FUND A GROWTH EUR

NORDEA EUROPN SMLLR COS FD A GRO EUR

OP-EUROPE DIVIDEND FIRM A

OP-EUROPE INDEX A

OP-EUROPE INDEX II A

POP EUROOPPA B

S-BANK EUROPE EQUITY FUND A

SAASTOPANKKI EUROOPPA B

SELIGSON & CO EUROPE INDEX A

UB EUROPE REAL ESTATE EQUITY A

UB EUROPE REAL ESTATE EQUITY K

Appendix 3. List of sample funds investing in Finland

AKTIA CAPITAL B

DANSKE INVEST FINNISH EQUITY G

EQ FINLAND 1 K

EVLI FINLAND SELECT B

EVLI FINNISH SMALL CAP B

NORDEA FINNISH PASSIVE FUND B GROWTH EUR

NORDEA FINNISH PASSIVE FUND I GROWTH EUR

NORDEA FINNISH STARS FUND A GROWTH EUR

NORDEA PRO FINLAND FUND I GROWTH EUR

OP-FINLAND A

OP-FINLAND SMALL FIRM A

POP SUOMI

SAASTOPANKKI KOTIMAA B

SELIGSON & CO FINLAND INDEX A

UB SUOMI A

UB SUOMI KASVU

Appendix 4. Average annual return and volatility of funds

Mutual Fund	Management Style	Compound Annual Growth Rate	Net Annual Return	Annual Costs%	Volatility
AKTIA AMERICA B	Active	8,37 %	6,42 %	1,95 %	15,79 %
DANSKE INVEST USA INDEX FUND G*	Passive	8,10 %	7,69 %	0,41 %	14,88 %
EQ USA INDEKSI 1 K*	Passive	9,08 %	8,70 %	0,38 %	14,48 %
LOCAL TAPIOLA ESG USA MID CAP A	Active	7,61 %	6,00 %	1,61 %	15,72 %
NORDEA NTH AMERICAN DIV FD A GRO EUR	Active	8,20 %	7,00 %	1,20 %	14,34 %
NORDEA NTH AMERICAN DIV FD I GRO EUR	Active	8,10 %	6,90 %	1,20 %	14,34 %
OP-AMERICA INDEX A*	Passive	9,00 %	8,60 %	0,39 %	14,63 %
OP-AMERICA SMALL CAP A	Active	7,59 %	5,63 %	1,96 %	18,24 %
OP-AMERICA VALUE COMPANIES FUND A	Active	7,16 %	5,31 %	1,85 %	15,33 %
OP-AMERIKKA INDEKSI II A*	Passive	9,11 %	8,90 %	0,20 %	14,63 %
S-BANK USA EQUITY FUND A	Active	8,34 %	6,84 %	1,50 %	14,68 %
SAASTOPANKKI AMERIKKA B	Active	8,47 %	6,60 %	1,87 %	15,08 %
SELIGSON & CO NORTH AMERICA INDEX A*	Passive	9,39 %	8,92 %	0,47 %	14,78 %
UB AMERICAN EQUITY A	Active	7,46 %	5,60 %	1,86 %	15,81 %
UB AMERICAN EQUITY K	Active	8,28 %	7,24 %	1,04 %	16,03 %
S&P 500 Composite	Index	9,50 %	9,50 %	0,00 %	14,49 %

Mutual Fund	Management Style	Compound Annual Growth Rate	Net Annual Return	Annual Costs%	Volatility
Aktia Europe B	Active	4,54 %	2,59 %	1,95 %	15,08 %
Alandsbanken Europe Equity B	Active	5,12 %	3,68 %	1,44 %	14,11 %
Danske Invest Europe High Dividend G	Active	5,06 %	3,27 %	1,79 %	13,18 %
Danske Invest Europe Small Capital G	Active	6,71 %	5,16 %	1,55 %	18,21 %
Danske Invest European Equity G	Active	5,72 %	4,32 %	1,40 %	13,59 %
EQ Eurooppa Osinko 1 K	Active	6,25 %	4,46 %	1,79 %	18,41 %
EQ Europe Small Capital 1MONTH	Active	5,84 %	4,04 %	1,80 %	18,10 %
EQ Europe Stock Index 1 K*	Passive	5,70 %	5,20 %	0,50 %	14,04 %
Evli Europe B	Active	5,81 %	4,21 %	1,60 %	17,28 %
Local Tapiola ESG Europe Mid Capital A	Active	3,66 %	2,15 %	1,51 %	14,98 %
Nordea European Passive Fund B Growth EUR*	Passive	5,63 %	5,13 %	0,50 %	14,39 %
Nordea European Passive Fund I Growth EUR*	Passive	5,74 %	5,34 %	0,40 %	14,39 %
Nordea European Stars Fund A Growth EUR	Active	6,10 %	4,63 %	1,47 %	15,40 %
Nordea European Smaller Companies Fund A Growth EUR	Active	5,89 %	4,28 %	1,61 %	14,05 %
OP-Europe Dividend Firm A	Active	5,19 %	3,35 %	1,84 %	13,77 %
OP-Europe Index A*	Passive	5,69 %	5,30 %	0,39 %	14,08 %
OP-Europe Index II A*	Passive	5,83 %	5,62 %	0,21 %	14,07 %
Pop Eurooppa B	Active	5,64 %	3,67 %	1,96 %	16,66 %
S-Bank Europe Equity Fund A	Active	4,63 %	2,83 %	1,80 %	14,02 %
Saastopankki Eurooppa B	Active	6,38 %	4,36 %	2,02 %	16,60 %
Seligson and Co Europe Index A*	Passive	5,99 %	5,53 %	0,46 %	13,83 %
UB Europe Real Estate Equity A	Active	3,41 %	2,06 %	1,35 %	18,50 %
UB Europe Real Estate Equity K	Active	3,77 %	2,92 %	0,85 %	18,51 %
MSCI EUROPE	Index	6,13 %	6,13 %	0,00 %	14,03 %

Mutual Fund	Management Style	Compound Annual Growth Rate	Net Annual Return	Annual Costs%	Volatility
Aktia Capital B	Active	6,08 %	4,18 %	1,91 %	16,29 %
Danske Invest Finnish Equity G	Active	5,24 %	3,80 %	1,44 %	16,24 %
EQ Finland 1 K	Active	7,19 %	5,60 %	1,58 %	16,39 %
Evli Finland Select B	Active	6,52 %	4,72 %	1,80 %	14,89 %
Evli Finnish Small Capital B	Active	8,57 %	6,97 %	1,60 %	17,82 %
Nordea Finnish Passive Fund B Growth EUR*	Passive	6,37 %	5,87 %	0,50 %	15,53 %
Nordea Finnish Passive Fund I Growth EUR*	Passive	6,47 %	6,07 %	0,40 %	15,53 %
Nordea Finnish Stars Fund A Growth EUR	Active	6,18 %	4,79 %	1,39 %	15,59 %
Nordea Pro Finland Fund I Growth EUR	Active	6,20 %	5,70 %	0,50 %	15,59 %
OP-Finland A	Active	5,64 %	4,04 %	1,60 %	15,59 %
OP-Finland Small Firm A	Active	6,57 %	4,57 %	2,00 %	18,08 %
Pop Suomi	Active	6,19 %	4,27 %	1,92 %	16,01 %
Saastopankki Kotimaa B	Active	6,25 %	4,28 %	1,97 %	15,92 %
Seligson and Co Finland Index A*	Passive	6,78 %	6,31 %	0,47 %	15,77 %
UB Suomi A	Active	6,00 %	4,37 %	1,63 %	15,65 %
UB Suomi Kasvu	Active	6,29 %	5,39 %	0,90 %	15,66 %
OMX HELSINKI (OMXH)	Index	6,02 %	6,02 %	0,00 %	14,80 %