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Comparative Analysis of Active and Passive ESG Funds in Europe during Volatile Times

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ABSTRACT:
This thesis examines the performance of actively and passively managed ESG equity funds domiciled in Europe from 2016 to 2023, with a particular focus on risk-adjusted returns during different market conditions. The study evaluates whether actively managed ESG funds justify their higher expense ratios by delivering superior performance compared to passive ESG funds. Using a comprehensive dataset of European-domiciled ESG equity funds, two portfolios, active and passive are constructed and assessed using multiple risk-adjusted metrics, including the Sharpe ratio, Sortino ratio, Jensen's alpha, and multifactor regression models such as the CAPM, Fama-French three-factor, and Carhart four-factor models.

The results indicate that actively managed ESG funds do not consistently outperform passive ESG funds on a risk-adjusted basis. In fact, the active portfolio often exhibits higher downside risk, as measured by Value-at-Risk and maximum drawdown, without delivering compensating returns. These findings suggest that the higher fees associated with active ESG management are not justified by superior performance. This underperformance can be attributed to closet indexing, where funds labeled as active closely replicate benchmark indices without offering genuine active management. However, as the study does not directly measure active share, further research is needed to determine whether the lack of outperformance is due to limited managerial skill or insufficient deviation from passive benchmarks. The thesis also discusses the implications of ESG constraints on portfolio construction, noting that the exclusion of certain sectors or industries may reduce diversification opportunities and make active ESG portfolios more sensitive to market fluctuations and sector-specific risks.

These findings have practical relevance for investors, fund managers, and financial advisors. For those seeking sustainable investment options, passive ESG funds may offer a more cost-efficient and risk-conscious alternative. The results indicate that, as transparency and cost-efficiency become increasingly important in the market, active strategies often fail to provide sufficient value to justify their higher fees.

KEYWORDS: ESG funds, Active investing, Closet indexing, European equity markets, Active share, Sustainable investing

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ABSTRACT:

Tämä tutkielma tarkastelee Euroopassa toimivien aktiivisesti ja passiivisesti hallinnoitujen ESG-osakerahastojen tuottoja vuosina 2016 - 2023, keskittyen erityisesti riskikorjattuihin tuottoihin erilaisissa markkinaolosuhteissa. Tutkimuksen tavoitteena on selvittää, ovatko aktiivisesti hallinnoitujen ESG-rahastojen korkeammat kulut perusteltuja niiden mahdollisesti tarjoaman ylituoton perusteella suhteessa passiivisiin ESG-rahastoihin. ESG-osakerahastojen aineiston pohjalta muodostetaan kaksi salkkua - aktiivinen ja passiivinen, joiden tuottoja arvioidaan useilla riskikorjatuilla mittareilla. Näitä mittareita ovat esimerkiksi Sharpen ja Sortinon suhde, Jensenin alfa sekä multifaktorimallit, kuten CAPM-, Fama-Frenchin kolmen faktorin ja Carhartin neljän faktorin mallit.

Tulokset osoittavat, että aktiivisesti hallinnoidut ESG-rahastot eivät johdonmukaisesti ylitä passiivisten ESG-rahastojen riskikorjattuja tuottoja. Aktiivinen salkku osoittaa usein suurempaa laskuriskialttiutta, kuten korkeampaa Value-at-Riskia ja maksimidrawdownia, kuitenkaan tuottamatta vastaavaa kompensoivaa tuottoa. Nämä havainnot viittaavat siihen, että aktiivisen ESG-salkun korkeammat kulut eivät ole perusteltuja paremmalla tuotolla. Tämä alisuoriutuminen voidaan liittää closet indexing -ilmiöön, jossa aktiivisiksi nimetyissä rahastoissa salkun koostumus seuraa vertailuindeksiä ilman todellista aktiivista salkunhoitoa. Tutkimuksessa ei kuitenkaan mitata aktiiviosuutta suoraan, täten jatkotutkimusta tarvitaan sen selvittämiseksi ja tutkitaan, johtuuko alisuoriutuminen rajallisesta salkunhoitajan osaamisesta vai riittämättömästä poikkeamasta passiivisiin vertailukohtiin. Tutkielmassa käsitellään myös ESG-rajoitteiden vaikutuksia salkunrakennukseen. Tiettyjen toimialojen tai sektorien poissulkeminen voi vähentää hajautusmahdollisuuksia ja tehdä aktiivisista ESG-salkuista herkempiä markkinaheilahteluille ja sektorikohtaisille riskeille.

Tuloksilla on käytännön merkitystä sijoittajille, salkunhoitajille ja talousneuvojille. Kestäviä sijoitusvaihtoehtoja etsiville passiiviset ESG-rahastot voivat tarjota kustannustehokkaamman ja riskitietoisemman vaihtoehdon. Tulokset osoittavat, että markkinoiden painottaessa yhä enemmän läpinäkyvyyttä ja kustannustehokkuutta, aktiiviset strategiat eivät useinkaan tarjoa riittävää lisäarvoa oikeuttaakseen korkeammat kulunsa.

KEYWORDS: ESG rahastot, Aktiivinen sijoittaminen, Piiloindeksointi, Eurooppalaiset osakemarkkinat, Aktiiviosuus, Kestävä sijoittaminen

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Abbreviations

ESG - Environmental, Social, and Governance

SRI - Socially Responsible Investing

PRI - Principles for Responsible Investment

GSIA - Global Sustainable Investment Alliance

AUM - Assets Under Management

CAPM - Capital Asset Pricing Model

MPT - Modern Portfolio Theory

EMH - Efficient Market Hypothesis

UN PRI - United Nations Principles for Responsible Investment

ETF - Exchange-Traded Funds

TNA - Total Net Assets

MVP - Minimum Variance Portfolio

MAR - Minimum Acceptable Return

SEC - Securities and Exchange Commission

CSR - Corporate Social Responsibility

VaR - Value at Risk

SMB - Small Minus Big

HML - High Minus Low

MOM - Momentum Factor

WML - Winners Minus Losers

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1 Introduction

The topic of environmental, social, and governance (ESG) and mutual funds is widely explored from various points of views, and this thesis will be an addition to the existing body of knowledge by providing a focused examination of the performance comparison between actively managed ESG funds and passively managed ESG index funds in Europe.

Mutual fund investing has increased significantly over the past 20 years, driven by factors such as low transaction costs, portfolio diversification, stock selection, and customer service (Gruber, 2024). Investors are presented with a wide selection of mutual fund options, ranging from traditional actively managed funds to passively managed index funds. However, for the past decade, with the emergence of ESG-related investing, there has been a notable shift in investor preferences towards funds that consider environmental, social, and governance factors alongside the fund's performance. According to the Global Sustainable Investment Alliance's (GSIA) 2022 report, the total assets under management (AUM) in sustainable investing have surged to 3,3 trillion dollars, illustrating the substantial growth and widespread acceptance of ESG principles among investors globally.

The ESG has developed into a widely recognised framework used by investors to evaluate the sustainability and ethical impact of their investments, in order to make more informed decisions that align with their strategic and long-term objectives (Li et al., 2021). Unlike the principles of responsible investment (PRI), which is a specific set of principles, ESG is a wider concept that can be applied in various ways, influencing a company's financial performance either positively or negatively (Li et al., 2021). ESG criteria serve as a foundation for sustainable investing, as it has become a significant factor in the evaluation of investment decisions due to the challenges that the world faces relating to climate change, social, environmental, and political instability. With the growing popularity of ESG-criteria implemented mutual funds, studies on the performance of these funds have become more common. This increased attention emphasises the need to understand how these funds operate. For instance, in their research, Chen and Scholtens (2018) have found no evidence that actively managed socially responsible investment (SRI) funds perform better than passively managed SRI funds in terms of stock returns. Moreover, the authors concluded that part of actively managed SRI funds exhibited behavior consistent with closet indexing. As the approach for this thesis is similar, it aims to explore the performance and characteristics of ESG-focused funds in Europe, utilising the findings of Chen and Scholtens (2018) as a starting point.

Recognising the increasing demand for sustainable investment options, investment organisations have found it necessary to incorporate a separate ESG sub-category within their fund offerings to meet the diverse preferences and objectives of investors. These ESG sub-categories provide investors with more detailed options customised to their specific ESG preferences, investment strategies, and risk tolerances. Given that the integration of ESG factors in decision-making lacks official standards, the Global Sustainable Investment Alliance (GSIA) has explored various investment approaches to guide investors and asset managers in aligning their investment goals. These approaches include ESG integration, thematic investing, stewardship, impact investing, norms-based screening, negative/exclusionary screening, and positive/best-in-class screening. Each of these will be detailed and explained later in the thesis.

Gruber (2024) mentions in his paper that investors can benefit from actively managed mutual funds because of the professional management and expertise provided in security selection. Although these funds generally come with higher fees and greater risk compared to passively managed funds, the author states in his paper that investors may value professional service and flexibility in stock selection, even if these funds underperform. In addition, the author also mentions that some investors are motivated to choose actively managed funds due to a belief that they can identify superior fund managers who will deliver outperformance.

This creates a dilemma for ESG-integrated actively managed funds, whether they can consistently justify their higher fees and active strategies to deliver superior returns.

These funds follow a specific strategy that incorporates active engagement with companies and stakeholders, which raises a question of whether incorporating ESG factors helps active funds outperform passive funds. With sustainability goals as a main driver in both active and passive funds, this study seeks to examine the performance of these funds and determine whether ESG integration in actively managed funds leads to superior risk-adjusted returns.

Although prior studies such as Chen and Scholtens (2018) have examined the performance of SRI funds, their findings are not directly comparable to ESG-focused portfolios, particularly within the European market. These studies often rely on broader definitions of sustainability and focus primarily on global or U.S. markets, leaving a gap in region-specific analysis of ESG fund performance under varying market conditions. Similarly, Fahling et al. (2019) and Pace et al. (2016) provide comparative analyses of active and passive funds, but do not isolate ESG-focused portfolios or account for performance during volatile market conditions. This thesis contributes to the literature by narrowing the scope to ESG equity funds domiciled in Europe and analysing their performance across different market conditions from 2016 to 2023. This thesis builds on previous research by incorporating multifactor regression models and a range of risk-adjusted performance metrics to assess whether actively managed ESG funds justify their higher fees.

1.1 Purpose of the Study and Motivation

The purpose of this thesis is to investigate the performance of actively managed ESG equity funds in comparison to passively managed peers. It aims to assess whether the higher fees associated with active management are justified by differences in abnormal returns and risk-adjusted performance. The importance of this analysis lies in understanding the value that active management brings to ESG investing. The aim is to create two portfolios of funds, where one consists of actively managed funds and the other of passively managed funds, to assess their performance.

The thesis focuses on European funds due to their advantageous ESG ratings, which are attributed to the region's regulatory frameworks and high sustainability reporting standards. Based on the latest Sustainable Development Report (2024), out of 50 United Nations member states, 39 were ranked in the top tier for their commitment towards achieving all 17 Sustainable Development Goals. The Nordic countries, such as Finland, Sweden, and Denmark, are particularly noteworthy, as they constantly appear in leading positions based on their ESG performance. Building upon the objectives outlined above, the following research question was developed:

1. Do actively managed ESG-focused funds offer better risk-adjusted returns and justify their higher expense ratios compared to passively managed ESG-focused funds?

1.2 Hypothesis Development

To investigate the performance of ESG funds, two hypotheses have been developed. The motivation for these hypotheses arises from the paper by Chen and Scholtens (2018), which conducts a comparative analysis of active and passive SRI funds. Their findings suggest that certain active SRI funds fail to deliver superior performance, often matching their benchmarks despite their stated objectives. This raises questions about whether active ESG funds truly provide superior risk-adjusted returns compared to passive ESG funds. Additionally, it suggests that their higher costs may not always be justified, which indicates that active management does not necessarily lead to better performance.

Several studies have examined the performance of active and passive portfolios across different markets. Fahling et al. (2019) analysed the German market, showing that while active funds slightly outperformed passive peers before expenses, they underperformed after expenses were accounted for. Pace et al. (2016), in their analysis of European and U.S. markets, found no advantage for active funds in terms of risk-adjusted returns and noted that active and passive funds performed similarly when expenses were excluded. Focusing on the U.S. market, Rompotis (2009) demonstrated that active ETFs underperformed both passive ETFs and market benchmarks. Crane and Crotty (2018) found that index funds exhibited greater performance persistence than active funds. Similarly, Elton et al. (2019) highlighted that ETFs consistently outperformed active mutual funds in terms of returns.

Active funds often fail to outperform passive funds as per evidence provided, but there is limited research exploring how ESG funds perform specifically in Europe. From the papers of Pace et al. (2016) and Fahling et al. (2019), it becomes increasingly clear that active funds frequently deliver similar performance as their passive peers. This raises the question of whether ESG integration in active funds genuinely adds value or simply attracts investors by appealing to sustainability. While the study by Chen and Scholtens (2018) investigated performance and closet indexing in active socially responsible investment (SRI) funds, research focusing on ESG funds in Europe remains limited. Thus, this study aims to address this gap and evaluate whether actively managed ESG funds show similarities in their performance relative to passively ESG managed peers.

The first hypothesis posits that there is no statistically significant evidence that passively managed ESG funds underperform in terms of risk-adjusted performance compared to their actively managed counterparts. It assumes that the efficiency and lower costs of passive strategies enable comparable outcomes without the need for active management. Therefore, the first hypothesis is:

H0 = There is no statistically significant difference in risk-adjusted performance between actively managed ESG funds and passively managed ESG funds.

The alternative hypothesis posits that actively managed ESG funds outperform passively managed ESG funds in terms of risk-adjusted performance.

H1 = Actively managed ESG funds provide significantly higher risk-adjusted performance compared to passively managed ESG funds.

1.3 Structure of the Thesis

The thesis is divided into five parts. The first section is the introduction to the study, which provides the research questions, the objectives of the study, and an overview of the research context. It is followed by the literature review, which examines previous research literature relevant to the study's topics. This section examines theories, methodologies, and findings from the existing literature related to ESG investing, active and passive management, fees in funds, and greenwashing.

The third part focuses on the theoretical framework supporting this research, with a thorough examination of Modern Portfolio Theory (MPT), the Efficient Market Hypothesis (EMH), and Agency Theory. MPT and EMH lay the foundation for assessing the performance of active and passive portfolios. Agency Theory, on the other hand, provides a crucial examination of the relationship between fund managers and investors, especially concerning potential conflicts of interest in funds' fee structures, where managers may prioritise fee structures that benefit themselves over the best interests of investors. Additionally, it addresses the issue of closet indexing, where funds marketed as actively managed fail to engage in active management.

The fourth part explains the sample collection method and introduces the methodology applied in the research. This section outlines the sampling criteria, risk-adjusted performance measures, and factor models, including the single-factor model, the Fama-French three-factor model, and the Carhart four-factor model. Finally, the fifth part presents the empirical results of the analysis, utilising the methods and models discussed above, and concludes with the study's key findings.

2 Literature Review

This chapter introduces the literature review and provides a thorough overview of existing research relevant to this study. It examines, discusses, and analyses key topics. Together, these provide a comprehensive overview of current knowledge on ESG-related funds, their fee structures, and transparency issues, including closet indexing and greenwashing.

2.1 ESG Investing

As awareness of sustainable investing has grown during the last decade, more investors and institutions have recognised the importance of ESG criteria in their investment processes. The GSIA (2022) report indicates that sustainable AUM has increased by 20% in most regions, excluding the US. At the same time, the report suggests a 5% annual decline in the proportion of assets classified as sustainable in Europe. The decline may be attributed to the tightening definition of the term "sustainable investing" and the increased requirements surrounding disclosure regulations (GSIA, 2022).

According to Schanzenbach and Sitkoff (2020), the roots of ESG investing can be traced back to the SRI movement of the 1980s, which emphasised ethical and moral considerations over generating higher returns. The birth of ESG emerged when the concept of SRI expanded to include corporate governance factors in addition to environmental and social issues. This rebranding, as stated by the authors, transformed the practice of investing in ESG into a more comprehensive framework that not only addresses ethical concerns but also aims to improve risk-adjusted returns by considering the broader impact of corporate practices on society and the environment.

In his paper, Matos (2020) notes that ESG investing is still evolving and faces several challenges, including inconsistent implementation standards and varying definitions of what constitutes a sustainable investment. Despite these challenges, ESG strategies have gained significant importance in the asset management industry, where they are increasingly viewed as essential for managing long-term risks and identifying investment opportunities. Matos (2020) also noted that with the growing popularity of ESG incorporation in both active and passive funds, there is a need for stricter and standardised ESG metrics to enhance transparency and tackle the issues of greenwashing and rainbow washing. Furthermore, Matos (2020) stated that there is no single, agreed-upon list of ESG considerations. However, the author provided a list of issues that companies face in their effort to increase their value. Table 1 below shows a summary of these ESG issues.

Environment (E)	Social (S)	Governance (G)
•Climate change and carbon emissions	•Workforce health and safety, diversity, and training	•Shareholder rights
•Natural resource use and energy and water management	•Customer and product responsibility	•Composition of boards of directors (independence and diversity)
•Pollution and waste	•Comunity relations and charitable activities	•Management compensation policy
•Ecodesign and innovation		•Fraud and bribery

Table 1. List of Main ESG Issues (Matos, 2020).

In their study, Kotsantonis et al. (2016) argue that incorporating ESG factors into investment decisions can lead to improved firm performance by enhancing its ability to manage risks that are not typically captured by traditional financial analysis. The authors argue that integrating ESG enables firms to better anticipate and adapt to regulatory changes and environmental challenges, which in turn can reduce costs and enhance operational efficiency. Additionally, the authors suggest that focusing on ESG factors may strengthen a firm's reputation and stakeholder relationships, thereby supporting long-term value creation.

The growing interest in incorporating ESG factors has rapidly increased the number of mutual funds that priorities these factors due to rising demand from investors. According to Reiser and Tucker (2019), ESG funds have outperformed their traditional counterparts in terms of both AUM and investor inflows. The niche ESG market has become a significant part of the industry, leading to the rebranding of numerous mutual funds and ETFs to include ESG considerations. The surge in popularity of ESG investing has started a debate about whether funds that incorporate ESG factors are actually delivering on their promises. Curtis et al. (2021) conducted research on ESG mutual funds to understand whether these funds align with ESG principles and whether these factors affect their performance. The results of their study show that ESG funds provide investors with increased exposure to ESG factors, indicating that these funds genuinely align their investments with their stated ESG objectives. Furthermore, they revealed that the incorporation of ESG does not lead to reduced returns nor increased costs. The study showed that ESG funds were able to maintain returns while incorporating ESG criteria, which suggests that integrating these factors into fund strategies does not come at the expense of profitability.

2.1.1 ESG Screening Approaches

With the increasing ESG investments around the globe, communication between investors requires a terminology that allows for a clear and consistent understanding of how ESG factors are integrated into investment strategies. This terminology helps standardise discussions and disclosures about ESG practices, ensuring that investors have a common framework to evaluate and compare the sustainability and ethical impact of different investments, which in turn supports more informed decision-making and promotes transparency. (GSIA, 2023). Figure 1 below illustrates the primary screening principles for identifying suitable investment strategies.

Figure 1. Main ESG Screening Approaches (GSIA, 2023).

Norms-based screening typically involves excluding investments that fail to maintain minimum standards set by international guidelines, such as those from the United Nations Global Compact, the International Labour Organisation, or other globally recognised organisations (GSIA, 2022). This approach aims to filter out companies that violate human rights, engage in corrupt practices, or contribute to environmental degradation. The Norms-based approach is also known as “minimum-standards screening” because it focuses on eliminating companies that do not meet the basic ethical or social criteria defined by international standards.

The Negative/Exclusionary screening approach refers to the strategy of excluding certain sectors, industries, or companies from investing in due to their involvement in activities that are considered undesirable or harmful. Companies involved in manufacturing weapons, operating in the gambling industry, engaging in fossil fuel extraction, or those that harm the environment through deforestation or pollution are typically excluded from a fund or investment portfolio.

Positive screening, on the other hand, focuses on companies, securities, various financial instruments, or even projects that demonstrate strong ESG performance. The process involves selecting investment opportunities that meet specific ESG criteria while filtering out those with low ESG ratings. Agapova et al. (2024) describe positive screening as a strategy that encourages investors to be more selective and inclusive in their portfolio construction by actively seeking out companies that focus on delivering high ESG standards. It is also worth noting that in a study by Agapova et al. (2024), Berry and Junkus (2013) found that investors tend to favor positive ESG screening over negative screening when selecting their portfolios, as indicated by their survey of a large sample of investors.

Best-in-class screening, similar to positive screening, is the process of selecting companies that demonstrate the strongest performance in ESG criteria within their respective industries. The primary difference between these two approaches is that best-in-class screening specifically compares companies within the same sector or industry, evaluating them against one another to identify the top performers in terms of sustainability ranking (GSIA, 2023). Furthermore, as stated in the report by Swiss Sustainable Finance (2020), utilising this approach allows investors to focus on companies with lower financial risks due to their strong sustainability standards, which can lead to more stable long-term returns. However, since this approach selects the best investment opportunities within a certain threshold, it also means that investors might include companies from industries that are not typically considered sustainable, often referred to as "sin companies," as long as these companies are top performers in their sector based on ESG criteria.

In addition to the stated ESG screening approaches, GSIA (2022) presents investment approaches that encompass broader strategies for integrating ESG criteria into investment decisions. These include ESG integration, thematic investing, stewardship, and impact investing. Such approaches are among the most commonly used by investors and serve as key frameworks for incorporating sustainability factors into the investment decision-making process.

2.2 Active and Passive Management

In portfolio management, there are two approaches to managing mutual funds: active management and passive management. As stated in the report conducted by Morningstar (2023), actively managed funds often struggle to beat their passive counterparts over the long-term period, with less than 25% of active funds surpassing their passive counterparts over the 10-year period. The report highlights that while some active managers can achieve short-term success, particularly in specific asset categories like real estate, bonds, and small-cap equity funds, the consistency and cost-effectiveness of passive management often make it a more reliable choice for many investors.

The paper by Garleanu and Pedersen (2022) illustrates the decline in direct ownership of U.S. equities and the simultaneous rise of delegated management, which includes both active management, such as mutual funds and hedge funds, and passive management, like mutual funds and exchange-traded funds (ETFs). The figure below showcases the changes in ownership structure, highlighting a significant decrease in household direct holdings of U.S. equities over the decades. Notably, the decrease in household direct holdings corresponded with an increase in the share of equities managed by professionals through approaches such as ETFs, as well as both active and passive management. The paper's results state that the significant increase in active management over the past few decades is largely due to the decline in information costs. This decline has enabled professionals to identify and capitalise on market inefficiencies, thereby facilitating higher returns.

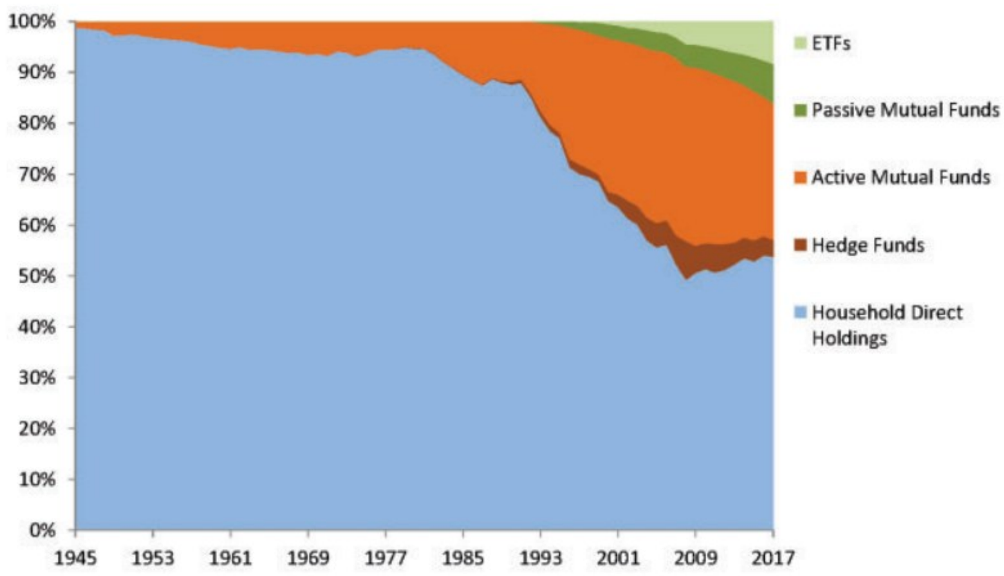

Figure 2. Ownership of U.S. equities (Garleanu & Pedersen, 2022).

With all the negativity and uncertainty surrounding active management due to its high fees and frequent underperformance relative to passive management, as stated in Morningstar’s report, Foster and Warren (2011) argue that some investors may still choose active management due to their belief in their ability to select skilled managers and dynamically adjust their portfolios. The decision is often driven by investors’ behavioral biases and their expectations towards experienced investment managers, despite the overall negative alpha that is commonly associated with active management. In the same paper, multiple authors such as (Barras et al., 2010; Fama and French, 2010; Koskowski et al., 2006; Wermers, 2000) have shown that the majority of U.S. fund managers fail to consistently generate positive alpha after accounting for management fees and transaction costs. Nonetheless, they manage to achieve a positive alpha of 0.40% to 0.50% before fees are deducted, indicating that active management can add value at the gross level.

Foster and Warren (2011) describe how investors can generate excess returns by carefully selecting fund managers who outperform the market. They argue that a lag between the market and the recognition of a manager’s superior performance allows early investors to gain higher returns before more money flows into the fund. This can be explained by the fact that as the fund manager's performance improves, more investments flow into the fund, making it more difficult for the manager to sustain the same level of outperformance, thus causing returns to gradually decrease. Finally, to improve returns, investors may consider changing managers, which is seen as a viable option that adds value to their strategy. This flexibility allows investors to adjust their investments, making long-term investing more efficient, rather than sticking with one manager for the entire period.

Sorensen et al. (1998) studied the allocation between active and passive management in the context of pension fund investments. In their paper, they analyse the trade-off involved in allocating assets to active managers, who aim to achieve higher returns, and passive managers, whose strategy is to follow the index. They showed that only managers with a sufficient amount of skill can generate excess returns above what the market offers. This raises a question about how consistently pension funds or mutual funds can identify and select such skilled managers that would outperform the index. Given the higher risks and costs associated with active management, the ability to assess managers’ performance becomes a crucial part in determining whether the potential for excess returns justifies the additional expenses. Finally, the authors state that despite the additional value active managers can bring to a portfolio, passive investments should still form a significant portion of the portfolio, especially when there are uncertainties regarding the manager's skill level.

Lastly, in their study, Dyck et al. (2013) investigate whether active management is actually capable of delivering superior returns compared to passive management, particularly in markets outside the U.S. The statement that the U.S. market is one of the most efficient in the world leaves little room for active managers to exploit mispricings and inefficiencies, making it challenging to outperform passive funds after accounting for fees. Thus, the authors propose to focus on non-U.S. markets, such as emerging markets and EAFE countries (Europe, Australasia, and Far East), where inefficiencies are more common, giving active managers a greater chance to capitalise on mispricings and achieve higher returns. The results show that active management significantly outperformed passive strategies in emerging markets and, to a lesser extent in EAFE countries. However, in the U.S., active management underperforms. The performance advantage of active management seems to increase in less developed countries, and due to these inefficiencies, investors tend to use active management more frequently in these markets.

In light of the evidence presented, active management may not need to be entirely dismissed solely based on its higher fees. Multiple academic papers suggest that passive management tends to outperform in developed markets. However, the paper by Dyck et al. (2013) illustrates that active management can add significant value, primarily in markets with mispricing and inefficiencies.

2.3 The Role of Fees in Fund Performance

One of the crucial parts of active management is its fee structure, as it directly affects both the profitability of the managers and the attractiveness of active funds to investors.

The fees of actively managed funds are expected to be justified by the fact that they are expected to deliver higher returns through continuous stock selection. The model in the paper of Stambaugh (2019) shows that even highly skilled managers, while able to generate higher returns, may not increase the total fee revenue for the entire industry. In this context, total fee revenue refers to the overall income that managers collectively earn from the fees they charge for managing active funds.

However, as the analysis by Garyn-Tal (2013) suggests, the relationship between fees and performance is far from consistent, with higher-fee funds often failing to justify their costs in terms of better returns when compared to lower-fee funds. Although the author mentioned that higher-priced management may generate higher gross returns, these returns are often not enough to cover the fees, resulting in lower net returns, even when the total returns are higher. Furthermore, Garyn-Tal's (2013) extensive study of 1,395 U.S. open-end mutual funds confirms a statistically significant negative relationship between expense ratios and fund performance, as measured by the alpha ratio.

With the increasing popularity, competition, and awareness, there has been a shift in investor preferences toward so-called 'no-load' funds, which are sold directly to investors with no commission or sales fees (ICI, 2023). Investors are increasingly opting for lower-cost funds, as they realise that higher fees do not necessarily translate into better returns. The report conducted by ICI (2023) indicates an overall decline in expense ratios for both actively managed and passively managed funds. With 92% of gross sales in 2023 going to no-load funds, this represents a significant shift compared to the year 2000, when only 46% of gross sales were directed toward no-load funds. The figure below showcases the decline in average expenses ratio throughout the years for both actively managed and passively managed funds.

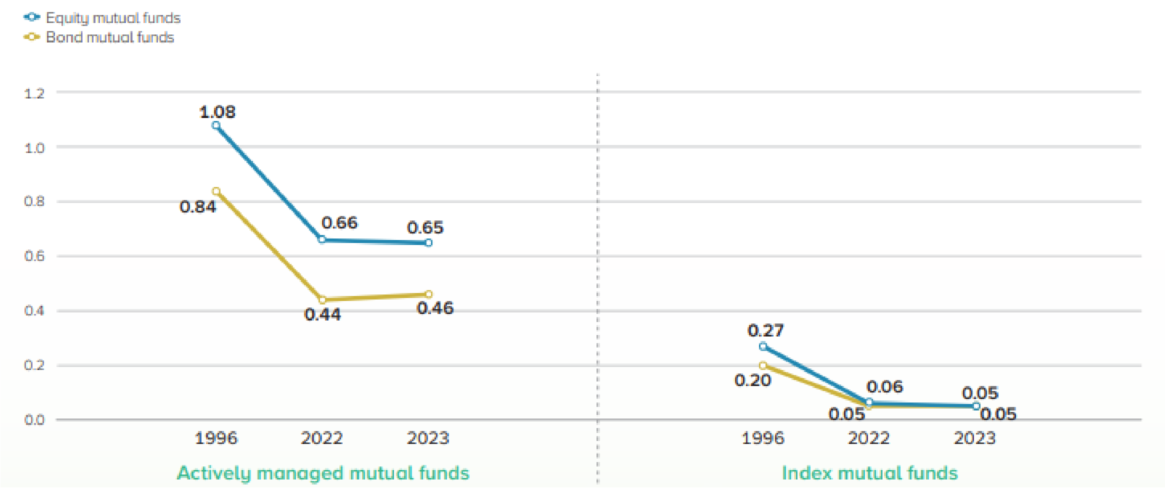

Figure 3. The Decline of Expense Ratio in Active and Index Funds (ICI, 2023).

The U.S. Securities and Exchange Commission (SEC) has introduced a range of regulations aimed at achieving full transparency of expenses associated with mutual funds and ETFs. These changes have helped to prevent any misleading representations of the fee structures and simplified the reporting process for shareholders. By mandating the presentation of fee structures, the SEC has addressed any misleading representations that may have previously existed in fund advertisements. This change ensures that investors have a clearer understanding of the true costs associated with mutual funds and ETFs (SEC, 2022).

The trend of declining fees also extends to ESG funds. Morningstar's (2024) latest report on ESG fund fees confirms that the fees of these funds have also been in decline due to increased competition among asset managers, the launch of numerous ESG strategies, and growing investor demand. Additionally, it is reported that European ESG funds managed to provide lower fees in comparison with conventional peers. Conversely, the U.S. ESG funds have generally shown a tighter fee gap with conventional funds. For instance, the US Large-Cap Blend Equity category shows relatively narrow differences in fees, with the average ESG fund charging 1,19%, compared to 1,22% for conventional funds.

Regarding active and passive ESG funds, both strategies have seen a significant decline in fees, and the gap between them has never been as narrow as it is now. Morningstar

(2024), however, states that even with the narrowed fee gap, lower-cost funds still have a higher probability of outperforming their more expensive peers, as demonstrated in the report. Moreover, it is stated that funds with lower fees are more likely to survive and have a higher probability of delivering superior returns.

2.4 Performance of Sustainable Funds in Volatile Times

Areal et al. (2010) investigated the performance of U.S. socially responsible (SRI) and sin stocks during the period of 1993 to 2009. During that time, they observed that SRI stocks tended to perform better during more volatile periods, such as those from 1993 to 2003 and from 2007 to 2009. This performance may be attributed to the fact that companies with strong SRI characteristics often display more resilient governance and ethical practices, which likely helped them withstand economic downturns and market crises more effectively. On the contrary, the authors found that sin stocks outperformed SRI stocks in less volatile times when less risk-averse and inclined to seek out higher returns. During crisis times, sin stocks had a lower beta, meaning they were less sensitive to market fluctuations, resulting in a decline in their returns. However, during periods of low volatility, their beta was higher, indicating greater exposure to market risks, which resulted in higher returns. Interestingly, the beta of SRI funds remained relatively stable during both low and high volatility periods.

Nofsinger and Varma (2014) compared SRI funds and conventional funds during the crisis period from 2000 to 2011. The authors validated the findings of Areal et al. (2010), showing that SRI funds generated positive abnormal returns during market crises. Although there was a slight, but not statistically significant, difference in beta between SRI and conventional funds, the authors concluded that the superior performance of SRI funds during market crises was driven not by lower beta, but by the ESG characteristics of the firms in their portfolios. During less volatile periods, SRI funds were slightly underperforming compared to conventional funds, with returns that were lower by approximately 0.67% to 0.95%. Comparing the result with the paper of Areal et al. (2010) shows that during non-crisis times, SRI stocks may limit the exposure to certain high-performing sectors that are typically excluded by SRI screening criteria. This limitation appears to be a key factor in the underperformance of SRI funds during non-crisis periods.

The paper of Leite and Cortez (2015) investigates SRI and conventional funds based in France from the period of 2001 to 2012. France was chosen as the primary country for this research because it experienced rapid growth in SRI investments during that time. The primary focus of the research was to conduct a comparative analysis of two types of funds during both crisis and non-crisis periods. Although the sample consisted of only 40 SRI funds and 120 conventional funds, the results showed that during non-crisis periods, conventional funds outperformed SRI funds, but their performance was similar during crisis times.

There are clear similarities in the findings across the papers, particularly regarding the strong performance of SRI funds during more volatile times and their underperformance during less volatile periods. Areal et al., (2010); Nofsinger and Varma (2014); and Leite and Cortez (2015) all support the notion that SRI funds offer resilience in times of volatility but tend to lag behind in stable periods.

2.5 Closet Indexing in Mutual Funds

The term closet indexing has sparked controversy due to its association with actively managed mutual funds that closely track their benchmark indices. This practice has become problematic because portfolio managers are not being transparent with their investment strategies, leading investors to believe they are paying higher fees for active management, while the fund's performance largely tracks a certain index. Despite charging fees equivalent to real active funds, these funds often fail to deliver superior returns and end up underperforming or merely matching the benchmark, primarily due to higher expenses and fees that are associated with these funds.

Taylor (2004) defines closet indexing as an approach where fund managers invest in similar stocks to those in the benchmark but make the fund slightly different by adding additional stocks or doubling down on some of the index stocks. This involves increasing the weight of particular stocks in the portfolio, which gives the impression of active management while still closely tracking the index.

The author concludes from his research that close indexing, although present in some mutual funds, is not widespread enough to present a systemic issue in the mutual fund industry. Taylor (2004) finds that a strategy of shorting closet-index funds and buying true index funds does not produce significant profits, as the performance of this strategy, measured by the Sharpe ratio, is similar to the overall market during the 1991–2000 period.

In another paper, Cremers and Curtis (2015) investigate closet-indexing in actively managed funds in the U.S., examining the extent to which these funds charge fees for active management. The paper estimates that over 10% of all active mutual funds in the U.S. are engaged in closet indexing, while significantly underperforming their benchmarks. A crucial tool used in the paper to identify closet index funds is Active Share, as it effectively distinguishes truly active funds from those that closely track their benchmarks. To identify closet index funds, the Active Share threshold was set at 60%; funds with an Active Share below this percentage are considered closet index funds. According to the results, funds that fell below this threshold consistently underperform both true index funds and more actively managed funds.

Surprisingly, the authors also stated that the closet indexing is an international problem, showing that in relation to the U.S., other countries are more exposed to this problem. For instance, according to the paper, Poland’s closet index funds account for 58% of mutual fund assets, while other countries like Sweden 56% and Finland 44% also have significantly higher rates of closet indexing compared to the U.S.

In another study, Cremers et al. (2015) show international evidence on closet indexing in active management. In their study, they found out that the percentage of closet indexing is higher in countries where the mutual fund industry is less competitive, regulatory oversight is weaker, and investors have fewer passive fund alternatives. All of this leads to less pressure on fund managers who are able to charge higher fees while deviating minimally from their benchmark indices. As a result, active funds tend to generate higher average alpha in countries where passive indices dominate, while countries with more closet indexing see lower average alpha.

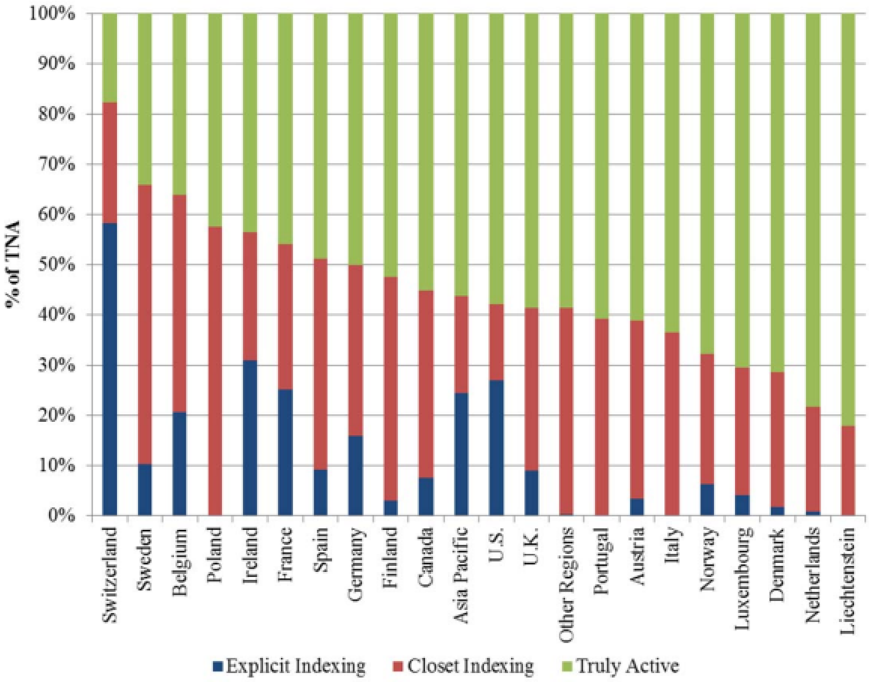

Figure 4. Explicit and Closet Indexing by Country of Domicile. (Cremers et al., 2015).

The figure above illustrates the distribution of Total Net Assets (TNA) across various international funds. In this context, explicit indexing refers to passive funds, and the figure shows that among European countries, Switzerland has the highest percentage of passive funds. However, closet indexing in Switzerland still exceeds the share of truly active funds. As noted in the study of Cremers and Curtis (2015), a few European countries exhibit a particularly high percentage of closet indexing. This figure illustrates the broader issue, revealing that closet indexing is far more widespread than previously mentioned, pointing to a significant problem within the European mutual fund industry.

2.5.1 Greenwashing

Greenwashing is another issue that investors must contend with. It is defined as the practice of creating the illusion that a fund integrates ESG criteria strategically to attract higher inflows, while in reality, using the ESG label to mislead investors (Kaustia & Yu, 2021). The authors state that greenwashing in mutual funds might be labeled as SRI, CSR (Corporate Social Responsibility), or sustainability terms that sound ESG-related, but in reality, they may conceal the funds' true investment practices from investors.

Kaustia and Yu (2021) examined the motivation behind ESG funds' rebranding and the outcomes of this approach. To address these aspects, they conducted a comprehensive analysis that involved comparing mutual funds before and after they rebranded as ESG, and assessing changes in investment flows. As a sample, the authors used the prospectuses of U.S. equity mutual funds to determine which funds declared themselves as ESG funds. They then utilised Morningstar's sustainability ratings to assess the objective ESG profiles of these funds. The results showed that the funds with an ESG label attract significantly higher inflows than non-ESG labeled funds, even when their actual compliance with ESG standards is low. This suggests that merely labeling funds as ESG can significantly boost capital inflow, indicating potential greenwashing practices. The long-term impact of rebranding the funds, however, shows no substantial improvement in inflows or performance, as informed investors eventually recognise the difference between ESG-labeled funds and those that genuinely comply with ESG standards.

Kim and Yoon (2020) investigated U.S.-based mutual funds that have signed the United Nations Principles for Responsible Investment (UN PRI). Their study aims to assess whether those funds that have signed the UN PRI actually incorporate ESG factors into their investment strategies after becoming signatories. More specifically, the authors aim to explore whether mutual funds that have signed the UN PRI have improved their performance after incorporating ESG attributes into their investment strategies. The study sample comprised 448 actively managed mutual funds, covering a six-quarter period before and after the signing of the UN PRI.

The authors found that fund inflows increased by 4.9% per quarter over the six quarters following the signing of the UN PRI, suggesting that investors may place value on ESG commitments. However, what is particularly notable is that, despite the increased inflow, the study found no significant improvement in mutual funds' ESG scores after the signing of the UN PRI. This led the authors to believe that many funds may be engaging in greenwashing, where ESG principles are used more for marketing purposes rather than for meaningful integration into their investment strategies.

2.6 Prior Studies on ESG Fund Performance

The number of ESG-related research papers is large. However, only a small portion of them focuses on investigating the performance of active and passive funds. Most studies tend to focus on comparisons between ESG or SRI funds and conventional funds, leaving a gap, especially in the European market. This subchapter will explore similar studies that have examined active and passive sustainable funds.

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The work of Chen and Scholtens (2018) examines active SRI funds and their performance relative to passively managed SRI funds in the US from 2004 to 2015, aiming to determine whether the higher fees associated with active management are justified by superior returns. The authors excluded all other fund types, except for equity funds, and managed to combine a sample of 142 funds in total. To avoid double-counting, the authors merged different share classes into one, simplifying the dataset and ensuring each fund is counted only once. The authors then categorised the funds into three groups based on their SRI strategy: environmentally responsible, religiously responsible, and socially responsible. The findings indicate that there is no difference in risk-adjusted returns between active and passive SRI funds. Notably, environmentally responsible funds exhibited superior performance, being the only strategy that outperformed passive SRI funds. In conclusion, the authors believe that investors may prioritise the issue of ethical or social impact over solely focusing on returns.

Another study conducted by Bauer et al. (2002) examines the performance of ethical equity mutual funds in comparison to conventional funds in the US, UK, and German markets from 1990 to 2001. In total, the authors collected a sample of 4384 conventional funds and 103 ethical funds. The main objective of this research is to find out if the returns on ethical investments are consistent, regardless of changes in the market or investment style. In addition, the authors also considered the influence of fees on the returns by comparing the performance of ethical and conventional mutual funds before and after deducting management fees.

Utilising the Carhart 4-factor model and alpha ratio, they found that there was no statistically significant difference in performance between ethical and conventional mutual funds across the three countries studied. However, their analysis showed that ethical funds had a higher expense ratio compared to conventional funds. To create more comparable results, the authors have decided to divide the funds into domestic and international categories. The results showed that US and UK domestic funds delivered higher returns than their international peers. Overall, the research found no evidence to suggest that ethical mutual funds outperformed conventional funds in terms of risk-adjusted returns during the studied period.

3 Theoretical Framework

This chapter showcases the main concepts that form the theoretical foundation of this study. First, the chapter will go through Modern Portfolio Theory and its extension, the Efficient Market Hypothesis. This is followed by an exploration of Agency Theory, which helps explain the relationship between investors and fund managers, as well as the issues that might arise when fund managers act as agents on behalf of investor principals.

3.1 Modern Portfolio Theory

Investing in various assets comes with different levels of risk that investors must accept in pursuit of higher returns. While investors expect to maximise their return, they must also consider their risk tolerance and understand that higher returns are typically accompanied by greater risk. Recognising the risk in an investment allows investors to make informed decisions about portfolio allocation.

This is a fundamental principle of Modern Portfolio Theory, developed by Harry Markowitz in 1952. It states that investors can optimise their portfolios by maximising returns while maintaining a given level of risk. According to Markowitz, the most important factor in achieving this balance is diversification, as it helps investors to mitigate unsystematic risk in a portfolio by spreading their investments across uncorrelated assets. These portfolios optimised using mean-variance analysis, which is a method that evaluates portfolios based on maximising expected return while minimising risk, can be represented by the efficient frontier, which shows a set of portfolios that provide the best risk-return trade-off on a curve. The figure is demonstrated below.

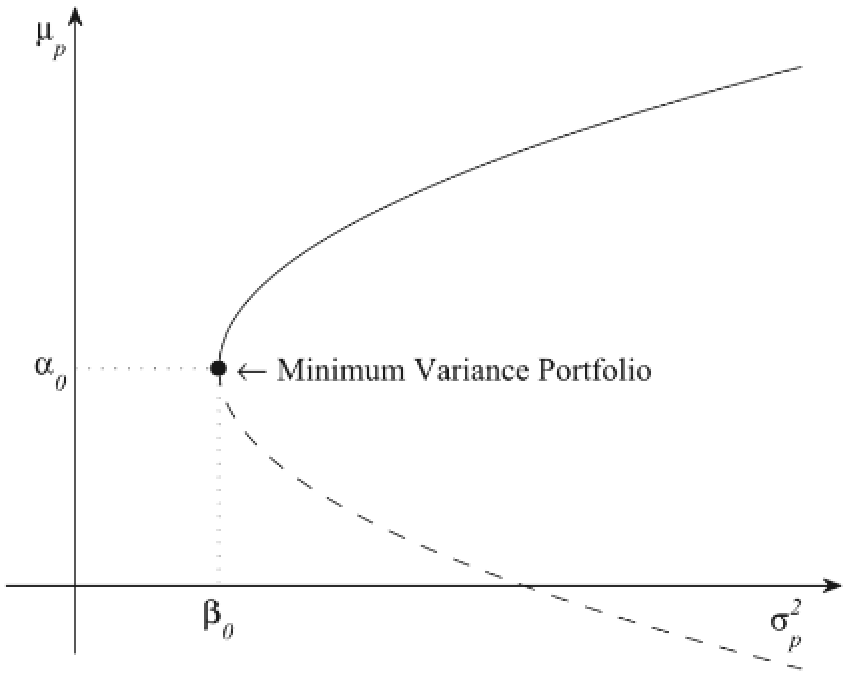

Figure 5. The Efficient Frontier (Best, 2010).

The minimum variance portfolio (MVP) represents the portfolio with the lowest risk for a given set of returns, making it the optimal choice for risk-averse investors who prioritise minimising risk. Investors who are less risk-averse often choose a portfolio higher on the curve, where the expected return is greater, though it also comes with increased risk. Every portfolio on the curve is efficient, as it offers the highest expected return for a given level of risk. However, portfolios inside the efficient frontier typically provide either lower returns for the same risk or higher risk for the same return, making them inefficient compared to portfolios on the curve. In the work of Cohn et al. (1975), the authors showed that wealthier investors, in particular, tend to allocate a higher proportion of their portfolios to risky assets, suggesting that these investors are willing to move further along the efficient frontier toward portfolios with higher expected returns and correspondingly higher risk.

Markowitz (1952) argues that portfolio diversification involves not just investing in a large number of stocks but selecting stocks with different correlations to reduce overall portfolio risk. The author emphasised that holding stocks from various industries and sectors enhances the portfolio by lowering total risk without sacrificing returns. With lower covariance, stocks tend to move differently during normal and abnormal market conditions, providing a safeguard against unsystematic risk factors. While diversification significantly reduces total risk, Markowitz highlights that it primarily mitigates unsystematic risk. However, systematic risk, as defined by Montgomery and Singh (1984), is the risk inherent to the overall market and cannot be eliminated through diversification. It reflects how a firm's stock moves in relation to the broader market, commonly measured by beta. Figure 6 visualises the advantage of diversification, showing how Markowitz's theory highlights the reduction in unsystematic risk as the number of stocks in the portfolio increases. As more stocks are added, the unsystematic risk reaches its minimum and eventually flattens out, leaving only systematic risk.

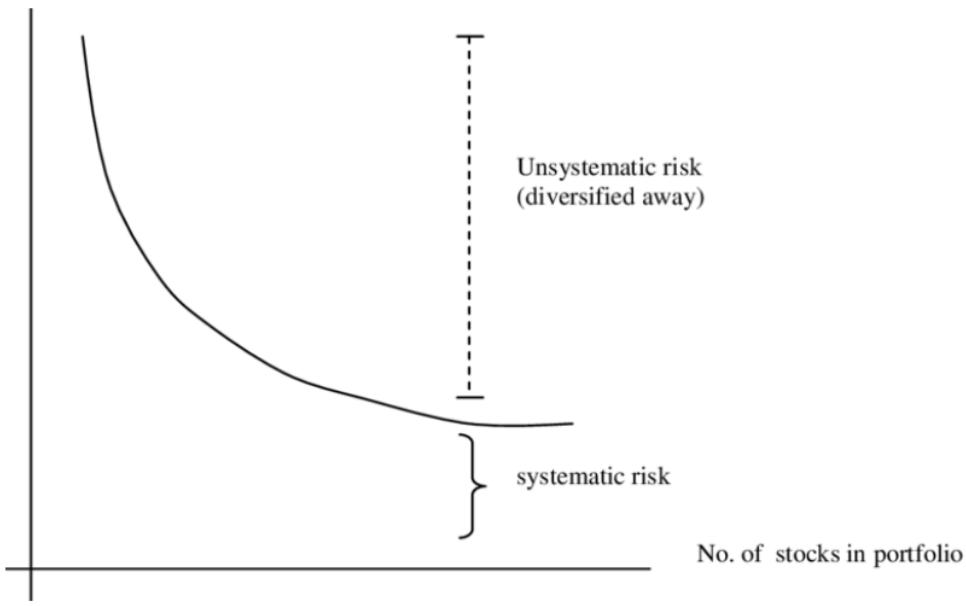

Figure 6. Systematic and Unsystematic risks. (Bacha, 2004).

Markowitz (1952) defines risk in a portfolio as variance, which measures the dispersion of returns within the portfolio. To better illustrate the impact of volatility on a portfolio, standard deviation, which is the square root of variance, is used. It provides investors with a clearer sense of the magnitude of deviation from the expected return of a portfolio.

In recent years, the rise of ESG investing has introduced additional constraints to traditional portfolio construction. Pedersen et al. (2020) argue that these ESG criteria can limit a portfolio's ability to achieve a higher Sharpe ratio, as the exclusion of certain sectors due to ESG screening can lead to underperformance in terms of risk-adjusted returns compared to unconstrained portfolios.

Similarly, Areal et al. (2010) noted that SRI screening can exclude certain high-performing sectors. This constraint on diversification challenges the traditional principles of MPT, as excluding low-ESG stocks reduces the potential for higher risk-adjusted returns and limits the overall efficiency of the portfolio. Furthermore, the authors noted that monitoring social performance in portfolios incurs extra fees, which damages overall returns by reducing the net performance of socially screened stocks relative to conventional portfolios. Rudd (1981) also argues that excluding certain industries due to social responsibility criteria introduces a permanent bias that prevents achieving an optimal diversified portfolio under MPT. This bias reduces the effectiveness of the portfolio by limiting diversification and increasing risk without providing compensating returns.

To visualise the constraints of ESG, the graph below is provided. It illustrates the differences between the traditional mean-variance frontier and the ESG-efficient frontier. The green curve represents the ESG-efficient frontier, while the grey curve represents the traditional mean-variance frontier, which includes all assets without ESG constraints.

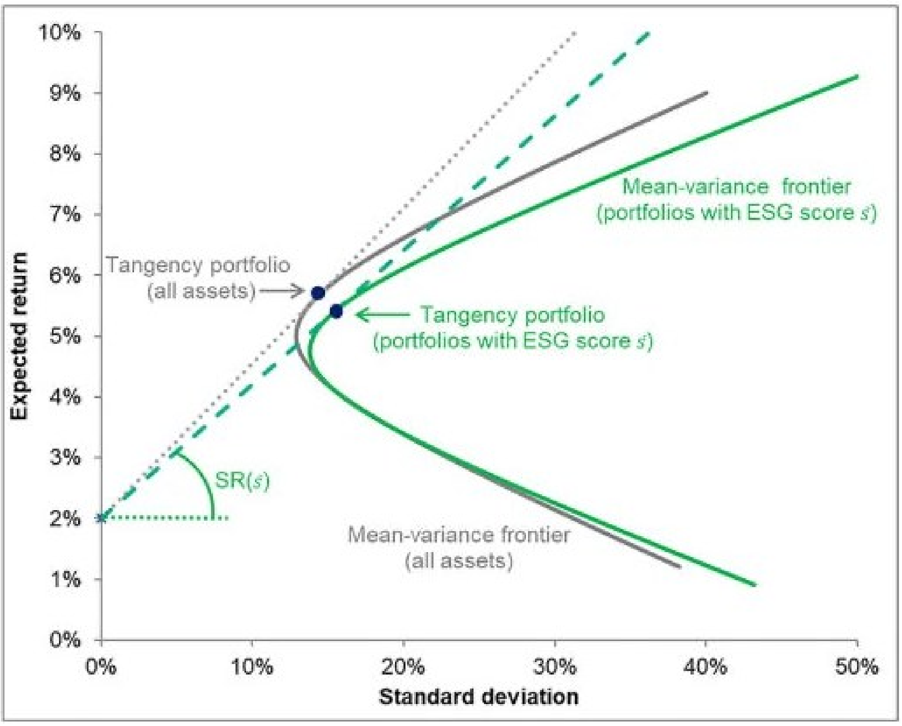

Figure 7. The ESG-efficient frontier. (Pedersen et al., 2021).

The figure provided by Pedersen et al. (2021) demonstrates the trade-offs between investing in an ESG-integrated portfolio and maintaining a fully diversified, unconstrained portfolio. While an ESG portfolio focuses on ethical and sustainability factors, it reduces the diversification potential and consequently the portfolio’s risk-adjusted returns. As mentioned by Pedersen et al. (2020), Areal et al. (2010), and Rudd (1981), the exclusion of certain sectors or industries due to ESG screening can shift the portfolio’s efficiency by limiting diversification and introducing constraints that restrict the ability to achieve optimal risk-adjusted returns and Sharpe ratio.

3.2 Efficient Market Hypothesis

The EMH, introduced by Eugene Fama and further explored in his 1970 paper, provides critical insights into the behavior of capital markets. Fama (1970) defines the EMH as the theory that all available information is fully reflected in stock prices. This implies that investors cannot consistently achieve returns higher than the average market return, as prices adjust immediately to new information, leaving no room for abnormal returns.

According to the theory, investors can only achieve higher returns by exposing themselves to higher risks.

In the paper, Fama (1970) presents three forms of market efficiency, each based on how information is reflected in asset prices. The weak form indicates that information and stock prices from the past fully reflect the stock price today. Therefore, according to the theory, it is impossible to achieve consistent excess return by utilising information and patterns from the past, as well as any historical data, such as price trends or volume data. This form implies that securities follow the random walk theory, moving in an unpredictable manner where prices change independently without retaining a memory of past price movements. The rationale behind why patterns are not exploitable, according to the author, is that if there is a rising trend in a stock, rational investors would act on it, causing the price to rise until the pattern no longer exists. The actions of these investors cause the market to adjust and incorporate information immediately, leaving no predictable patterns for others to exploit.

The semi-strong form, in contrast, suggests that all publicly available information is instantly reflected in stock prices. This includes data, such as information from public announcements, financial reports, or news, which is quickly incorporated into market prices. As a result, prices adjust almost immediately to new information, making it impossible for investors to consistently earn excess returns through either fundamental or technical analysis. This form challenges the ability to earn excess returns solely from publicly available information, indicating that investors would need to rely on additional information, such as private or insider information, to achieve excess returns.

The strongest version of the hypothesis states that all public and insider information is already reflected in stock prices. According to this form, even investors with insider information cannot consistently gain excess returns. However, Fama (1970) recognises empirical evidence suggesting that some investors may have privileged information that could be used to gain excess returns. Nevertheless, Fama argues that while there are some exceptions, they are quite rare.

Many studies, as mentioned in the paper of Titan (2015), either reject or support the EMH. However, after critical review of the theory, the author provides evidence showing that the validity of EMH is highly dependent on the methodology used and the market/economic conditions. Many empirical studies have been conducted using event studies to test market efficiency. The findings show mixed results, with some studies suggesting that stock prices adjust quickly to new information, while others indicate that it can take months or even years for prices to fully readjust to new information. The analysis of different EMH forms contradicts the assumption of consistent efficiency across all markets. While many papers support the weak form, the semi-strong and strong forms face more challenges. The author presented several studies that show evidence of delayed price reactions and insider trading. Both of these factors suggest that markets do not always incorporate new information efficiently, allowing investors to take advantage of and gain from these inefficiencies. In light of this, the author concluded by expressing that a new theoretical model is needed to account for all changes in market conditions and anomalies that are not explained by the current forms of EMH.

Lo (2007) states that since all participants have access to the same information at the same time, it becomes more challenging to gain an edge over the market, as any potential profit opportunities are quickly identified and exploited. As a result, any advantage that active managers might have quickly disappears, leaving little room for exploiting profit opportunities. This competition among active managers drives the market toward greater efficiency by eliminating the very opportunities they seek to capitalise on. Lo (2007) argues that this process ultimately benefits passive management, as it becomes a more viable option in highly efficient markets where profit opportunities for active managers are quickly eliminated by competitive forces. However, in less efficient markets, active managers still have an edge, as information may not be as widely available or is harder to interpret.

3.3 Agency Theory

The agency theory plays a crucial role in fund management, as it explores the separation of interest between ownership and control, where fund managers (agents) make investment decisions on behalf of investors (principals). Panda and Leepsa (2017) explain that the main drivers of agency theory are differing goals that may arise between managers and investors, variations in risk preferences, and information asymmetry. It can be argued that, even with available fund information, such as a factsheet or prospectus explaining the fund's objective and strategy, fund managers may still differ in their intentions. Some may prioritise outperforming a benchmark over the short term rather than focusing on long-term ESG goals, driven by their personal beliefs or incentives.

The theory is particularly relevant in active management due to the greater discretion and control fund managers have over decision-making. This connects agency theory to the concept of closet indexing, as the potential information asymmetry inherent in active management can hide managers' tendency to track benchmark indices closely, despite claiming to be actively managing the fund.

In their paper, Panda and Leepsa (2017) discuss agency costs, which arise from conflicts between principals and agents. Active fund managers may incur higher agency costs due to the discretion they employ in stock selection and ESG-related decisions, which can diverge from the ethical goals of investors. The study by Ferris and Yan (2009) presents indicators for assessing agency costs in mutual funds. In contrast, public funds often charge higher fees in an attempt to achieve superior short-term returns. This approach conflicts with the interests of fund shareholders, who generally prefer lower costs to maximise net returns. The authors conclude that, more often than not, the organisational structure of a fund management company significantly influences its agency costs. Public funds, in particular, tend to display greater conflicts between fund managers and investors. Similarly, Dalmacio and Nossa (2004) found that higher fees do not necessarily lead to better fund performance, which challenges the idea that higher compensation for fund managers results in better returns for investors.

Peng and Isa (2020) identified at least three problems that investors might face when investing in ESG-related assets. These problems play a significant role, especially in fund management, where investors rely heavily on fund managers to make decisions related to stock selection and ESG integration. Brown et al. (2006) and Barnea and Rubin (2010), as cited by Peng and Isa (2020), point out the first problem, which involves managers using ESG initiatives to gain personal benefits, such as improving their reputation for being socially responsible, even if it comes at the cost of shareholder returns. As mentioned by Panda and Leepsa (2017), fund managers and investors may have differing understandings of ESG goals in funds. However, the deeper roots of this problem may lie in fund managers' tendency to prioritise personal benefits, such as professional reputation or meeting performance benchmarks that are tied to their compensation.

The second problem, as mentioned by Schuler and Cording (2006) and Allouche and Laroche (2005), as cited by Peng and Isa (2020), relates to the financial costs of implementing ESG practices into funds. These costs, according to the authors, are directly taken from the firm's capital, which sacrifices profitable projects to engage in ESG activities that do not maximise returns. Hence, this action puts a company at a disadvantage by allocating resources to projects that may not provide short-term returns. Finally, the third problem mentioned by Peng and Isa (2020) is so-called window-dressing. The strategy involves fund managers covering the fund's poor performance by participating in ESG-related actions to improve the fund's public image.

In active management, agency theory becomes highly relevant, as it highlights the risks associated with investing in these funds. Therefore, understanding these risks is crucial in determining whether fund managers' actions align with investors' interests.

4 Data and Methodology

This chapter explains the main concepts utilised in the paper, beginning with an explanation of data selection and followed by an overview of the measures applied in the research.

As part of this research, the aim is to investigate whether paying higher fees for actively managed ESG funds is worthwhile, given the uncertainty that these funds will deliver superior returns. To achieve this, the study will adopt a methodology similar to that of Chen and Scholtens (2018) and create two portfolios: one comprising actively managed ESG funds and the other comprising passively managed ESG funds. Moreover, the study will also follow the steps of Bauer et al. (2002), Ibikunle and Steffen (2015), and Kreander et al. (2005) by employing three widely recognised models to assess the performance of the two portfolios: the Capital Asset Pricing Model (CAPM), the Fama–French three-factor model, and the Carhart four-factor model (Sharpe, 1964; Fama & French, 1996; Carhart, 1997). These regressions are used to capture the risk-adjusted returns of the funds and to identify the factors that contribute to their performance, such as market risk, size, value, and momentum.

4.1 Data Selection

The dataset for this paper was acquired through the Bloomberg Terminal's fund screening tool, which allowed for the selection of funds based on multiple criteria. The screening process involved narrowing down the universe of over 1.26 million funds by applying filters such as market status, fund attributes, asset class focus, geographical focus, currency, primary share class, and inception date. This process resulted in a final selection of 367 ESG funds that meet all the specified criteria for analysis. The criteria applied in the screening process are explained in detail below. Table 2, however, shows an overview of the filtering steps, including the number of matching funds at each stage as the criteria were progressively applied.

		Matches
1)	Universe Criteria	1 261 745
2)	Market Status: Active	452 627
3)	General Attributes: ESG, Socially Responsible	115 752
4)	Fund Asset Class Focus: Equity	62 161
5)	Fund Geographical Focus: European Region	6 608
6)	Currency: EUR	5 017
7)	Fund Primary Share Class: YES	647
8)	Inception Date <= 1/1/2016	367

Table 2. Fund Screening Criteria and Results.

The initial step in filtering out the funds for the study involves selecting funds that are operational and available in the market. This ensures that only active funds, open to investors, are included in the sample. Importantly, all funds in the final selection have continuous data available from the start to the end of the analysis period. The importance of having consistent data without any gaps that could arise from inactive or newly launched funds ensures a more accurate and reliable comparison of performance across the entire time period. However, omitting the funds that ceased to exist during the analysis period introduces survivorship bias, as these funds, which often underperform or face other issues, are excluded from the sample. This approach is intentional, as including such funds would require significant additional effort in gathering historical data or accessing specialised datasets that account for inactive or closed funds. Despite this limitation, it is important to acknowledge and address the potential for survivorship bias, as it may influence the overall conclusions of the study. In addition, incubation bias is addressed in the criteria, as discussed by Crane and Crotty (2018, as cited in Evans, 2010). To ensure the inclusion of funds with a broader historical performance, an inception date of 2016 or earlier is used.

The second step is to select funds that meet the criteria relevant to this study. These include ESG and socially responsible attributes, which are central to the research as they prioritise only funds that integrate sustainability and ethical considerations into their investment strategies. Additionally, socially responsible funds ensure the inclusion of funds that specifically seek to avoid investments in industries or companies deemed harmful or unethical, such as those involved in fossil fuel extraction, tobacco production, or arms manufacturing.

The research’s fund sample is limited to equity funds, while also taking into account ESG-focused ETFs, excluding fixed-income, money market, and alternative asset class funds. By narrowing the scope to equity-based funds and ETFs, the study is more likely to yield accurate findings, as these investments provide a more suitable basis for comparing risk-adjusted returns. Since the research focuses on funds within Europe, the corresponding criteria were applied to capture funds from across the region. This focus is particularly relevant given that Europe is positioned as a leader in integrating ESG factors into investment strategies. Its regulatory environment strongly supports sustainable practices and enforces strict reporting requirements, creating a more transparent landscape for ESG investments (Gonçalves et al., 2021).

One of the most important factors considered when filtering out the funds is the application of a single currency for comparison, specifically the euro. The paper by Hassan and Zhang (2020) explains that interest rate differentials between currencies play a crucial role in determining returns. Lower-interest-rate currencies are considered safer and tend to appreciate during downturns, while higher-interest-rate currencies carry more risk but offer higher returns to offset potential depreciation. This risk-return difference makes currency risk a key factor when comparing fund performance across different countries. Riskier currencies may boost fund performance during growth periods but lead to greater losses in downturns (Hassan & Zhang 2020). Thus, selecting funds with euro-denominated assets is the most optimal approach for this study, as it minimises currency risk and allows for more accurate comparison of fund performance.

To account for the possibility that funds may have multiple share classes and to avoid double-counting, as discussed in the works of Crane and Crotty (2018) and Chen and Scholtens (2018), the decision was made to include only the primary share class of each fund. However, a limitation of this approach is that some ESG-based funds were excluded because their primary share class was denominated in a currency other than the euro. Consequently, after filtering, 367 funds remained, of which three were removed due to data restrictions, leaving a final total of 364 funds. With monthly data for each fund over the sample period from 1.1.2016 to 31.12.2023, the total number of observations is 34 944. This frequency helps reduce the short-term fluctuations seen in weekly data while being less responsive to immediate market changes.

With a total dataset of 364 ESG funds, 29 are classified as passive, while the remaining 335 are categorised as active. This distribution reflects a trend within ESG investments, showing that active management is more common among ESG funds. The two types of funds will be divided into two portfolios, one consisting of active funds and the other of passive funds. This division will allow a direct comparison between the portfolios, allowing for a deep analysis of their respective performance.

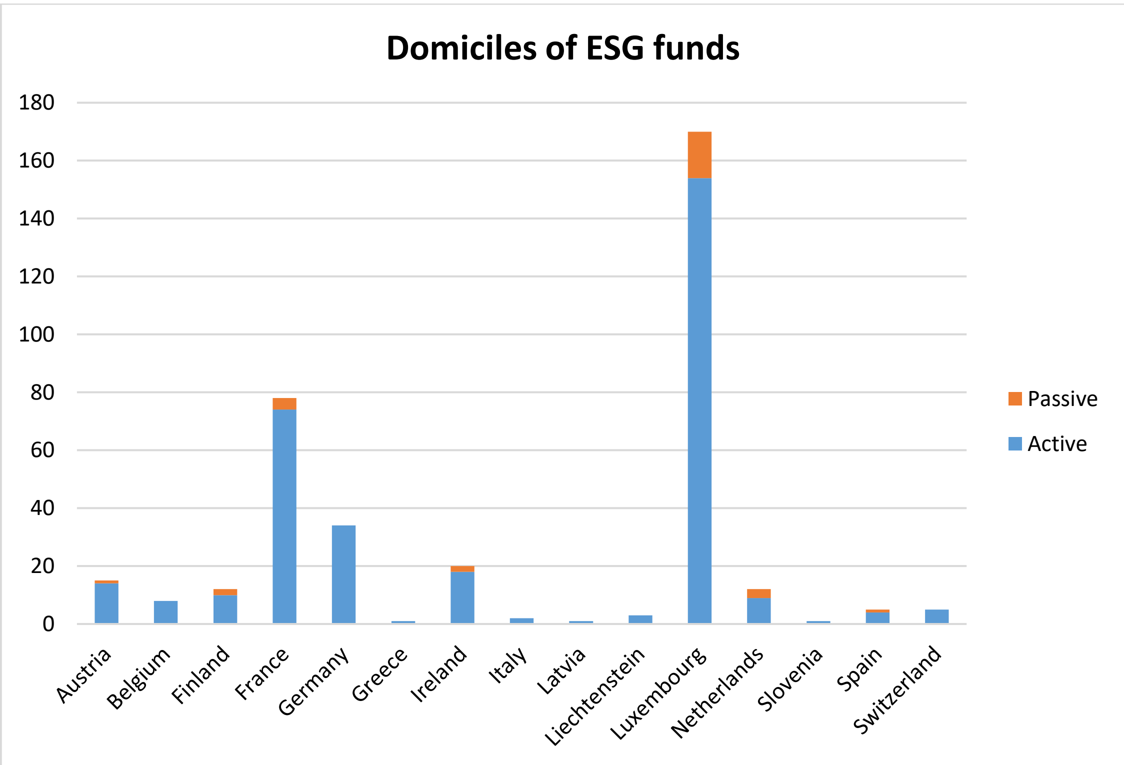

Figure 8. Distribution of ESG Funds by Domiciles.

As illustrated in Figure 7, the majority of ESG funds are domiciled in Luxembourg and France, with Luxembourg hosting the highest number of funds. This trend suggests a concentration of ESG funds in these financial hubs, which are often favored for their favorable regulatory environments. Germany also has a significant number of ESG funds, primarily active, while other countries, such as Austria and Ireland, have smaller but notable proportions.

4.1.1 Benchmark and Risk-free Rate

In this research, the Stoxx Europe 600 is used as the primary benchmark index. It is chosen because it represents a diverse range of companies across various sectors, capturing almost 90% of the investable market (STOXX, n.d.). The selection of this benchmark provides a comprehensive measure of the European market, which includes both ESG-integrated companies and those that may not prioritise ESG factors. This broader view enables a thorough assessment of ESG portfolios in relation to the overall market. As the largest and most comprehensive index in Europe, it provides a robust benchmark for evaluating whether ESG funds can achieve comparable or superior performance under stable and more volatile market conditions.

For this research, the German 10-year government bond yield is used as the risk-free rate, providing a stable benchmark for evaluating the risk-adjusted returns of ESG funds.

4.2 Performance Measures

To measure the performance of both active and passive portfolios, several performance measures will be applied. Over the past decade, there has been a significant rise in developments, including new methods for measuring the performance of investment portfolios. Traditional measures, such as the Sharpe Ratio, Treynor Ratio, and Jensen's Alpha, remain foundational, each providing a distinct approach to risk-adjusted returns. Thus, they will be employed in this research along with the Appraisal Ratio. Together, these measures will offer a comprehensive view of portfolio performance, showing both the risk-return trade-offs and the manager’s ability to generate excess returns relative to benchmarks.

4.2.1 Sharpe Ratio

Sharpe ratio, being one of the fundamental measures for portfolio performance, evaluates the excess return per unit of risk by comparing a portfolio's returns to a risk-free as set (Aragon & Ferson, 2007). Initially developed by William Sharpe in 1966, its intention was to provide a reliable measure for assessing how well the returns of a mutual fund compensated for the risk taken by the fund manager. However, the ratio is more practical when assessing the overall risk of an entire portfolio rather than focusing solely on an individual fund (Aragon & Ferson, 2007). The Sharpe ratio defines risk as the standard deviation of the portfolio's returns, while the risk-free rate serves as the benchmark return against which the portfolio's performance is measured. Finally, utilising the portfolio's return minus the risk-free rate to get the excess return, which is divided by the standard deviation to get the final number. The formula is presented below:

$$Sharpe\ ratio = \frac{R_p - R_f}{\sigma_p}, \tag{1}$$

where,

R_p = Expected portfolio return
R_f = Risk-free rate
σ_p = Standard deviation of portfolio

A positive Sharpe ratio indicates that the portfolio has achieved higher risk-adjusted returns relative to the amount of risk taken. This suggests that the portfolio achieved returns that are reasonably high relative to the risk taken. On the other hand, when the ratio is below 1, it suggests that the risk taken in the portfolio is not justified, and the portfolio might be underperforming due to lower returns. In rare cases where the Sharpe ratio approaches zero, it indicates that the portfolio's returns are close to or below the risk-free rate, suggesting that the portfolio is not sufficiently compensating for the risk taken.

4.2.2 Sortino Ratio

Sortino ratio is being compared to Sharpe ratio due to its similarities in evaluating risk-adjusted returns. It is less known that the original creator of the Sortino ratio is Brian Rom, who developed the ratio in 1983. It was later named after Frank Sortino for his work on promoting the use of downside risk (Booth & Broussard, 2016). The key difference is that Sortino focuses solely on the downside risk, which addresses only the negative deviations from the minimal acceptable return (MAR) (Sortino & Price, 1994). Srivastava and Mazhar (2018) further note that while the Sharpe ratio is more commonly used to evaluate low-volatility portfolios, the Sortino ratio is more practical for assessing portfolios with higher volatility. In high-volatility scenarios, when the portfolio fluctuates significantly, upside volatility is less of a concern, whereas downside risk becomes more critical in such environments due to its focus on negative deviations and the potential for loss. Booth and Broussard (2016) also explain that the Sortino ratio has an advantage over the Sharpe ratio during more volatile periods, as it helps investors better assess the risk of losses rather than overall volatility, especially when diversification strategies might fail. The formula for this ratio is illustrated below:

$$Sortino\ ratio = \frac{R_p - R_f}{\sigma_d}, \tag{2}$$

where,

R_p = Expected portfolio return
R_f = Risk-free rate
σ_d= Downside deviation

The excess return in the formula is divided by the downside deviation, with a higher value indicating better risk-adjusted performance relative to the MAR. The higher number indicates that the portfolio is effectively generating returns while minimising the risk of falling below the MAR. A low ratio, on the other hand, suggests that the portfolio is performing poorly, generating lower returns than the MAR, or experiencing higher downside risk.

4.2.3 Jensen's Alpha

This ratio was first introduced by Michael Jensen in 1968 in his paper on the performance of mutual funds. The Alpha ratio measures a portfolio manager's skill by comparing portfolio's actual returns to the expected returns based on the portfolio's risk, as calculated by the CAPM. The ratio helps to understand how much of the portfolio's returns are due to manager's skill, rather than just markets movements. The formula is shown below:

$$Jensen's\ Alpha = R_p - (R_f + \beta_p(R_m - R_f)\ , \tag{3}$$

where,

R_p = Expected portfolio return
R_f = Risk-free rate
β_p = Beta of the portfolio
R_m = Expected market return

A good indication is when Alpha is higher than zero, meaning that the portfolio has outperformed the expected return, and thus the portfolio manager has added value. Conversely, a negative Alpha indicates that the portfolio or shares have underperformed relative to what the CAPM model predicts (Dayaratne et al., 2006). This suggests that the portfolio has provided returns smaller than what would be expected given its level of systematic risk.

4.2.4 Treynor Ratio

The Treynor ratio measures the returns a portfolio achieves relative to each unit of risk taken, specifically systematic risk. It is similar to the Sharpe ratio, but the key difference is in the denominator. The Treynor ratio uses beta, which measures market risk, whereas the Sharpe ratio uses the standard deviation of returns to account for total risk. Treynor (1965) introduced this ratio to measure how well a portfolio performs when exposed to market risk. The formula is shown below:

$$Treynor\ ratio = \frac{R_p - R_f}{\beta_p}, \qquad (4)$$

where,

R_p = Expected portfolio return
R_f = Risk-free rate
β_p = Beta of the portfolio

Since the ratio takes into account the systematic risk, it specifically evaluates how well the portfolio manager has performed in generating returns relative to the market movements. This ratio assumes that unsystematic risk has already been minimised through diversification, thus focusing solely on the market risk that cannot be avoided. A higher Treynor ratio indicates better risk-adjusted returns relative to market risk, while a lower ratio suggests less efficient performance in compensating for systematic risk.

4.2.5 Appraisal Ratio

The appraisal ratio is not as commonly used as other performance ratios mentioned in this research. It measures the value added by a manager's skill by comparing the excess return generated by the portfolio to the unsystematic risk taken. This helps assess whether the manager’s active decisions contribute positively. Wang (2017) notes that the appraisal ratio effectively indicates a manager’s ability in individual stock selection, rather than primarily reflecting overall market movements.

To calculate the ratio, the first step is to estimate Alpha, which can be derived from the CAPM. Alpha is then divided by residual risk, which can be derived from the standard deviation of the residuals. The formula is shown below:

$$Appraisal\ ratio = \frac{\alpha}{\sigma_\epsilon}, \qquad (5)$$

where,

α = Alpha

$\sigma\epsilon$ = Residual risk, known as the standard error of regression

A high appraisal ratio indicates that the portfolio manager earns a higher return per unit of residual risk. This suggests that the manager has superior stock-picking ability. Conversely, a low appraisal ratio suggests that the returns are not sufficiently compensating for the residual risk, or that the alpha generated is insufficient to justify the risk taken.

4.2.6 Expense Ratio

The concept of an expense ratio has grown and become more relevant as mutual funds began to attract an increasing amount of capital and gained popularity among retail investors. Several studies have highlighted the importance of low-cost investing and how higher fees do not necessarily justify better performance. Both Sharpe (1991) and Carhart (1997) argue that a higher expense ratio negatively impacts fund returns. Additionally, Carhart (1997) suggests that the average dollar in active management yields lower returns compared to a passive management dollar after accounting for expenses. Nevertheless, it is highly important to consider the expenses incurred in performance analysis.

$$Expense\ ratio = \frac{\text{Total Operating expenses}}{\text{Total Investment in the Fund}}, \tag{6}$$

Where total operating expenses include all the costs that the fund incurs to operate, total investment in the fund refers to its total value, also known as asset under management.

4.3 Regression Models

Factor models are utilised as a part of this research to analyse risk-adjusted performance of ESG portfolios by identifying the impact of systematic factors such as market risk, size, value, and momentum on their returns. As mentioned in the study of Ibikunle and Steffen (2015), the motivation behind utilising factor models is to understand performance differences and provide a robust methodological framework. In addition to the CAPM single-factor model, this research extends the analysis by incorporating the Fama-French three-factor model and Carhart's four-factor model. With the ability of the four-factor model, the research will be able to evaluate portfolios on a broader scale, as the single-factor model is insufficient to capture all factors of portfolio performance. By controlling for additional factors, the model ensures that performance differences are not attributed to specific characteristics, such as small-cap or growth stocks. The three-factor model is utilised in this study to give a more comprehensive view on portfolio performance, but according to Bauer et al. (2002), it still cannot explain the cross-sectional variation for portfolios with momentum-driven returns, thus, the four factor-model is also employed to incorporate a momentum factor.

4.3.1 Capital Asset Pricing Model

The CAPM model was first developed by Sharpe (1964), Treynor (1962), Lintner (1965), and Mossin (1966). The framework shows the relationship between an investment's expected return and its risk (Perold, 2004). It provides a systematic way to measure a risk that cannot be diversified away, which is market risk.

In addition to quantifying risk, the CAPM is used in portfolio construction to optimise the trade-off between risk and return in order to create an efficient portfolio that minimises risk while maximising expected return. The CAPM incorporates the market risk premium, which represents the additional returns that investors demand for a higher risk that was taken. The premium is adjusted by the beta factor, which essentially serves as an indicator of the asset's volatility or sensitivity relative to the broader market.

The other component of CAPM is the risk-free rate, which is the base return that investors would receive by investing in a risk-free asset, such as government bonds.

The single-factor model of the CAPM is the simplest formula for measuring return estimations, as it relies solely on one factor, which in this case is the asset's beta (β_m) relative to the market.

$$R_{it} - R_{ft} = \alpha + \beta_m(R_{Mt} - R_{ft}) + \varepsilon_t , \qquad (7)$$

Where the difference between the actual return R_{it} and the risk-free rate R_{ft} is referred to as the excess return of asset i at time t. The intercept α represents Jensen's Alpha. While $\beta_m(R_{Mt} - R_{ft})$ is the market risk premium that represents expected return of the market (R_{Mt}), and the risk-free rate (R_{ft}). Finally, the error term (ε_t) that is a portion of an asset's return that cannot be explained by the model.

4.3.2 Fama-French Three-Factor Model

The three-factor model developed by Fama and French is an extension of the CAPM that incorporates additional factors to better explain asset returns. The idea behind this model is to capture the cross-sectional variations in stock returns that the CAPM cannot explain, as it relies solely on market beta as the explanatory variable (Fama & French, 1993).

The authors explained in their study that, historically, small-cap companies have outperformed large-cap companies, with their average return being higher due to higher risk exposure and market inefficiencies. Thus, the authors have included the size factor (SMB) as a part of the model, as it captures the difference in returns between small-cap and large-cap companies, making it an essential part of reflecting how company size impacts returns.

The third factor incorporates the value effect, which measures the difference in returns between value stocks and growth stocks, utilising the book-to-market (BM) ratio. The factor high minus low (HML) captures the value effect and states that companies with higher BM tend to outperform those with lower BM, usually growth stocks.
The data and equations for factor models are sourced from the Kenneth R. French data library. The data is then converted from USD to EUR to account for currency differences. Below, the SMB factor is presented as follows:

SMB = *1/3 (Small Value + Small Neutral + Small Growth) - 1/3 (Big Value + Big Neutral + Big Growth)*

where SMB represents the difference between the average return on three small portfolios and the average return on three large portfolios. The HML is presented as:

HML = *1/2 (Small Value + Big Value) - 1/2 (Small Growth + Big Growth)*

where HML represents the difference between the average return on two value portfolios and the average return on two growth portfolios.

The three-factor model, presented below, includes the additional factors SMB and HML. Furthermore β_1, β_2 and β_3 are defined as factor coefficients corresponding to each of the model's risk factor.

$$\mathrm{R}_{it} - \mathrm{R}_{ft} = \alpha + \beta_1(\mathrm{R}_{Mt} - \mathrm{R}_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \varepsilon_t , \tag{8}$$

4.3.3 Carhart Four-Factor Model

The four-factor model extends the three-factor model by adding a momentum factor (MOM), which captures the movement of a stock in one direction, either upward or downward, with the expectation that the trend will continue in the same direction. Initially, the model was developed by Carhart in 1997 when the author analysed the persistence of mutual fund performance and found that adding a MOM factor enhanced the model's ability to explain return variations that the three-factor model could not fully account for. Further supporting this, Gumanti et al. (2017) noted in their study that the four-factor model not only reduced pricing errors but also provided a more accurate explanation of portfolio return variations when compared to the three-factor model.

The MOM factor, as represented in the Kenneth R. French data library, is often called Winners Minus Losers (WML) and is constructed as the equal-weight average of recent winners minus recent losers. The formula for the MOM is presented below:

MOM = 1/2 (Small High + Big High) – 1/2 (Small Low + Big Low).

Thus, the four-factor model is presented as follows:

$$\mathrm{R}_{it} - \mathrm{R}_{ft} = \alpha + \beta_1(\mathrm{R}_{Mt} - \mathrm{R}_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \varepsilon_t , \qquad (9)$$

where the regression model is similar to the three-factor model but extended to account for the influence of MOM.

Empirical Analysis

This chapter presents the findings of the analysis conducted. The first part provides the descriptive statistics of the data and shows the results of key performance metrics. This is followed by a comparative analysis of both portfolios, which aims to explain differences in performance, risk profiles, drawdown, and Value at Risk (VaR). The portfolios are then assessed using performance metrics, and the chapter concludes with a thorough analysis utilising factor models.

4.4 Descriptive Statistics

The first part of the empirical findings focuses on presenting descriptive statistics of the monthly returns for actively and passively managed ESG portfolios. The column labels Active and Passive (M) represent the average monthly returns of the portfolios, calculated as the average of the returns of all the funds within each portfolio for each month. Overall, nine variables are considered, which capture various aspects of central tendency, dispersion, and performance characteristics of the portfolios.

	Active (M)	Passive (M)
Mean	0,005	0,006
Median	0,010	0,013
Variance	0,0017	0,0016
Standard Deviation	0,041	0,041
Minimum	-0,156	-0,148
Maximum	0,125	0,140
Range	0,282	0,289
Coefficient of Variations	8,378	6,854
Standard Error of Mean	0,004	0,004

Table 3. Descriptive Statistics.

The table shows that the mean return for the passive portfolio is slightly higher on a monthly basis. This indicates that the passive portfolio managed to generate a marginally better return on average each month. Similarly, the median results show the same trend, with the median return for the passive portfolio being consistently higher than the active one. In terms of risk, variance, and standard deviation, both portfolios showed almost identical results, with only slight differences between them. According to MPT, this suggests that the passive portfolio is more efficient, as it delivers higher returns for a similar level of risk. This suggests that the risk profiles of both portfolios are quite similar, with only minor variations in how returns fluctuate over time. The similarity in risk suggests that active management might have failed in reducing volatility compared to the passive approach, indicating that the additional effort of fund managers with active management did not translate into lower portfolio risk.

The monthly minimum of the passive portfolio suggests that it might have better downside protection compared to the active portfolio. The active portfolio experienced greater losses, with 0.8% more on a monthly basis. Regarding the maximum, the passive portfolio also achieved higher peak returns of 14%, surpassing the active portfolio over the research period. The range for these portfolios, on the other hand, indicates how both portfolios fluctuated in returns, with the passive portfolio showing a slightly wider range. This suggests that it experienced greater variability between its highest and lowest returns.

The results of the coefficient of variations (CV) for monthly returns indicate that the passive portfolio managed to provide more efficient risk-adjusted returns compared to active portfolios. With a higher CV, the active portfolio seeks to outperform the market through active management strategies, but this also introduces greater variability in returns. The monthly results indicate that the active portfolio has a less favorable risk-return ratio, resulting in greater volatility compared to its average returns. While the CV values for both portfolios are relatively high, the passive portfolio remains more efficient compared to the active portfolio. According to the EMH, the passive portfolio’s lower CV reflects the result of a passive strategy that avoids the extra risks active managers take when trying to beat the market. In contrast, the higher CV of the active portfolio shows the additional variability that is potentially caused by fund managers attempting to exploit market inefficiencies, which, under the EMH, is unlikely to succeed.

Similar results of standard error explain how much the average value of the data might change if repeated many times. A similarly lower value tells that both portfolios have consistent and reliable average returns, where their mean returns are likely to be close to the true average returns. In other words, these estimates provide a high level of confidence that the calculated average data is accurate and represents the actual performance.

	Active (M)	Passive (M)
Skewness	-0,601	-0,366
Kurtosis	2,195	2,193
Autocorrelation	-0,083	-0,111

Table 4. Skewness, Kurtosis, and Autocorrelation.

The skewness of both portfolios shows negative values, which indicates that the distribution is left-skewed. This means that both portfolios have relatively fewer positive values and more negative ones, causing the distribution to extend toward the left tail. Doane and Seward (2011) explain that in the case of negative skewness, the median is usually higher than the mean because extreme negative values drag the mean lower. The skewness for the active portfolio shows greater negative asymmetry and a higher possibility of experiencing extreme negative values. This also refers to the fact that active managers take on more aggressive decisions, which can result in more volatile outcomes. Kurtosis, like skewness, measures the shape of the return distribution. It focuses on identifying extreme values in the tails of the distribution. With a higher kurtosis suggesting heavier tails, where there is a greater possibility of extreme positive or negative returns compared to a normal distribution. Lower kurtosis, on the other hand, suggests light-tailed distributions, where the possibility of extreme returns is lower. Regarding active and passive portfolios, both show similar results with monthly values, indicating more peaked (leptokurtic) distributions as defined by Chissom (1970). This outcome is expected due to higher price fluctuations on a monthly basis. Autocorrelation tells whether the returns are related to a previous period's returns. It shows whether there is a pattern in how portfolios performed from one period to the next. For both portfolios, the autocorrelation is negative, indicating that positive returns are more likely to be followed by negative returns, and vice versa. Since both portfolios showed negative autocorrelation values, they do not demonstrate a momentum effect. Instead, it is more likely that a negative return will be followed by a positive return in the next month, and conversely, a higher return will be followed by a lower return.

4.5 Comparative Analysis

The figure below demonstrates the cumulative returns of active and passive portfolios. The data is calculated as the average monthly return, which is then compounded over time to represent cumulative performance. As shown, both portfolios have experienced positive cumulative growth, although this did not come without high fluctuations over the years. Throughout the entire research period, the passive portfolio managed to outperform both the active portfolio and the benchmark index. Despite the relatively similar performance of both portfolios from 2016 to the start of 2022, the passive portfolio began to significantly outperform the active portfolio from approximately February 2022, around the time when the Russia-Ukraine conflict started.

Figure 9. Cumulative Returns of Active and Passive Portfolios From 2016 to 2023.

As seen in Figure 9, which provides a closer view of cumulative returns in late 2018, both portfolios experienced a decline from October to December 2018, with the active portfolio falling by 13.84% and the passive portfolio by 11.10%. The period of heightened market volatility has seen an active portfolio being outperformed by a passive portfolio, despite the potential for active management to make adjustments to mitigate losses. The passive portfolio also seems to recover at a slightly faster rate. This can be attributed to its ability to benefit from broader market rebounds and avoid the stock selection biases of active management.

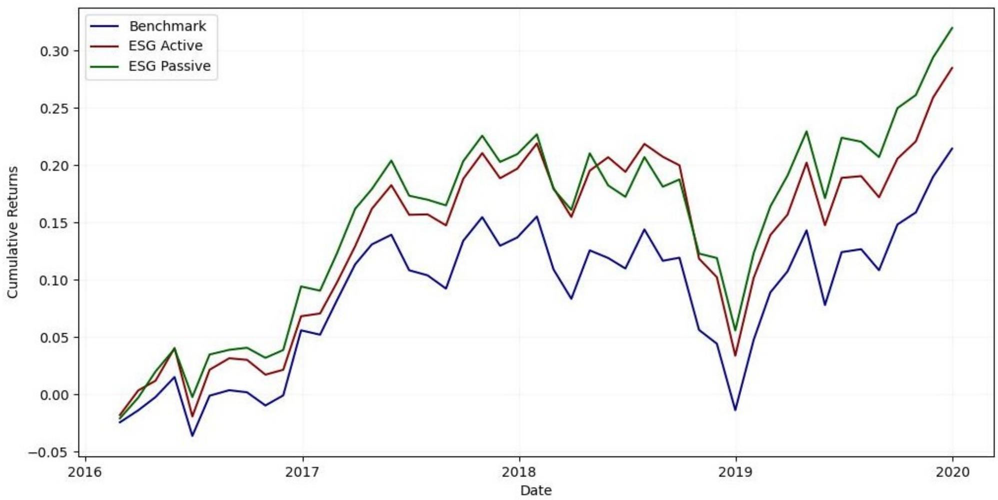

Figure 10. Cumulative Returns of Active and Passive Portfolios From 2016 to 2019.

Over the first three months of 2020, as shown in figure 10, both portfolios experienced significant declines, with the largest drop occurring in March: -22.33% for the active portfolio and -22.85% for the passive portfolio. The rebound after the initial COVID-19 shock was strong for both portfolios, driven by large-scale fiscal and monetary interventions that helped revive the stock market. In general, the passive ESG portfolio provided better cumulative returns, with the passive strategy showing a steadier growth trend and benefiting from market gains without the risk of bad active decisions.

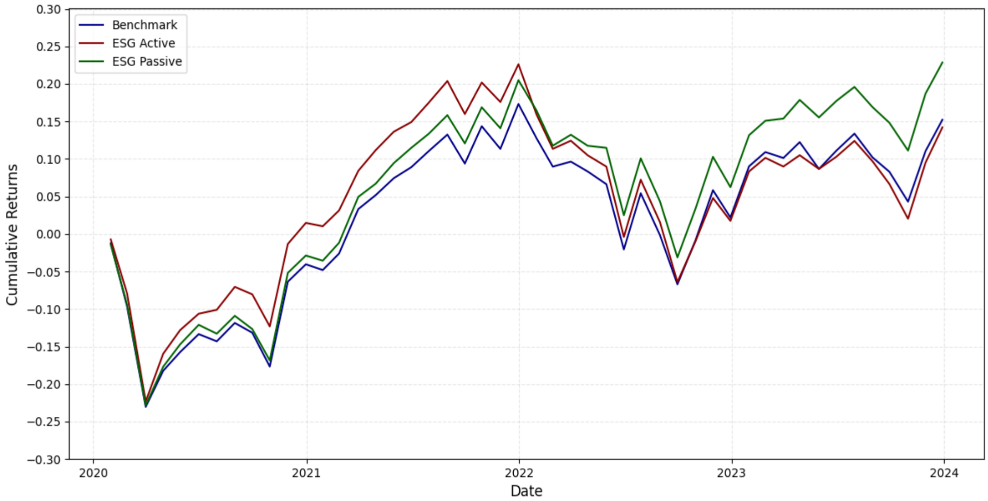

Figure 11. Cumulative Returns of Active and Passive Portfolios From 2020 to 2023.

4.5.1 Downside Risk and Drawdown Analysis

The downside risk represents the risk of experiencing losses or bad outcomes below a certain target level (Menezes et al., 1980). In simpler terms, it measures the probability of a stock or portfolio returning less than a set threshold, which is often considered a safety level for protecting against significant losses. The figure below presents VaR at a 95% confidence level, which shows that there is a 95% probability of the portfolio's losses not exceeding 3,39% for the passive portfolio and 3,01% for the active portfolio in a given week. This means that, with 95% confidence, the maximum expected loss for both portfolios in a given week is 3,39% and 3,01%, while the remaining 5% represents the likelihood of losses exceeding these levels.

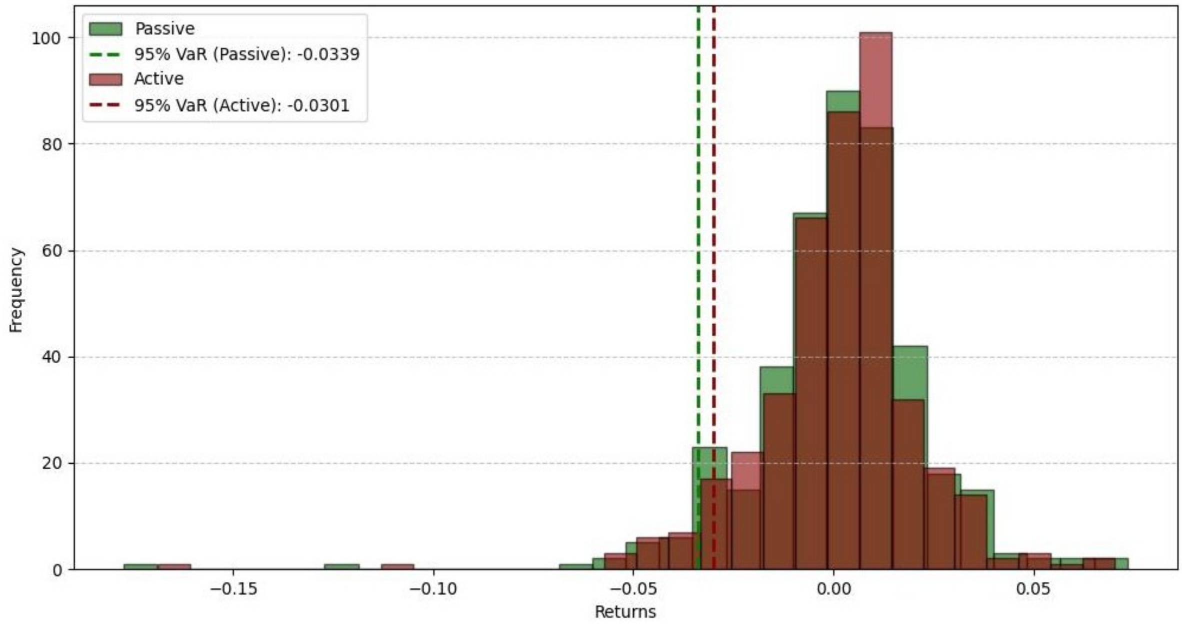

Figure 12. Value-at-Risk at 95% confidence level.

Under similar market conditions, the figure implies that the passive portfolio would be slightly more exposed to potentially larger losses compared to the active portfolio. The slightly higher exposure could result from the passive portfolio’s greater weekly volatility, but that alone cannot explain the full extent of its increased risk. Since VaR results are showing similar patterns, this appears to contradict the typical advantage expected from active management. According to VaR, it is suggested that the active portfolio may not be delivering its intended risk-reduction benefits. The cost of maintaining a sustainable portfolio with active fund managers seems less and less attractive, especially if the risk profile of the active portfolio does not sufficiently differ from its lower-cost passive peers.

In the figure below, the drawdown of both portfolios is showcased to further assess the extent and frequency of losses each portfolio experienced throughout the research period. The figure illustrates the frequency and magnitude of decline for each portfolio from its peak values.

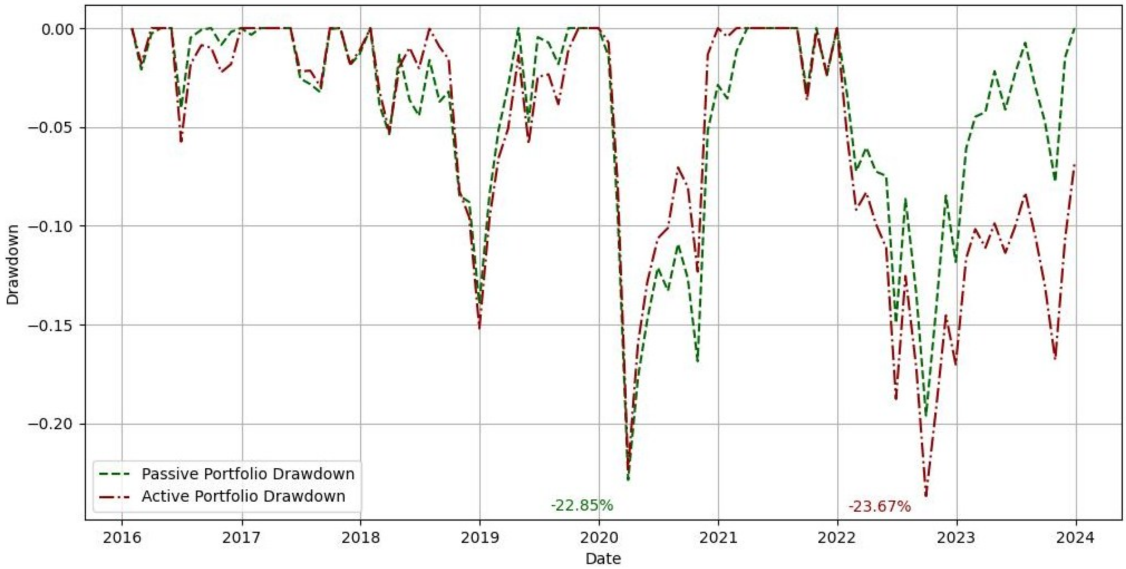

Figure 13. Portfolio Drawdown.

As can be seen from the figure, the maximum drawdowns of each portfolio are -22,85% and -23,67%. While the passive portfolio experienced a less severe drop of -19.60% in September 2022, the highest overall drop was recorded by the active portfolio in the same month. For the passive portfolio, the maximum drawdown was recorded during the COVID-19 shock in March 2020, reaching -22,85%, while the active portfolio experienced a similarly severe drop, achieving a close figure of -22,33%. In general, both portfolios exhibited multiple drawdown periods. However, the passive portfolio generally recovered more gradually. In contrast, the active portfolio appears to pursue higher returns by actively adjusting its holdings, which makes it more exposed to short-term fluctuations. With active management decisions, the active portfolio recovered more quickly after the COVID-19 shock, but it ultimately underperformed in 2023, when its performance lagged behind the passive portfolio.

4.6 Risk-Adjusted Performance Metrics

Examining the risk-adjusted metrics for both portfolios in table 5, the Sharpe ratio for the passive portfolio is consistently higher than that of the active one on an annual basis. This, along with the comparative performance analysis, confirms that the passive portfolio consistently offers better risk-adjusted returns than the active one. The Sharpe ratio being under 1 for both portfolios suggests that the returns generated are insufficient to justify the level of risk taken. A key factor contributing to this low Sharpe ratio could be the relatively high volatility observed in both portfolios: 14,06% for the passive portfolio and 14,18% for the active portfolio, which lowers the ratio. A variation of the Sharpe ratio, the Sortino ratio focuses solely on downside risk, and the results reveal that the passive portfolio far outperforms the active portfolio. This implies that the passive strategy is significantly more effective at converting downside risk into positive returns. The lower Sortino ratio for the active portfolio can be attributed to its greater exposure to downside risk. This reduced performance may result from decreased return stability and increased exposure to variability, likely driven by the fund manager’s tactical allocation decisions, which can lead to sharper declines in active funds during volatile market conditions.

	Active	Passive
Sharpe ratio	0,399	0,496
Sortino ratio	0,538	1,781
Jensen's Alpha	0,015	0,028
Treynor ratio	0,057	0,072
Appraisal ratio	0,271	1,219

Table 5. Annualised Risk-Adjusted Metrics.

For Jensen’s Alpha, the annual results are positive but relatively low. The excess returns generated by both portfolios are minimal, indicating that neither portfolio has significantly outperformed the benchmark on a risk-adjusted basis. The Treynor ratio shows that the passive portfolio offers superior performance compared to the active one. This suggests that the passive portfolio offers a better return per unit of market risk. The higher ratios observed in the passive portfolio may suggest that ESG-related investments improve the portfolio's performance. This could be attributed to the lower risk often associated with ESG investments, as they incorporate sustainability factors that help identify potential risks and opportunities not fully captured by market prices (Torri, 2023).

In regard to the appraisal ratio, the passive portfolio demonstrates significantly greater efficiency in generating excess returns relative to its unsystematic risk. As shown, its ratio of 1,219 is considerably higher than the active portfolio's 0,271, making it a more effective choice for risk-aware investors.

The results of the risk-adjusted metrics provide strong evidence favouring the passive portfolio over the active one. The passive portfolio was able to maximise its return for a given level of risk and consistently performed better. According to MPT, an optimal portfolio achieves the best possible returns while minimising risk, which is reflected in the passive portfolio's superior risk-adjusted metrics. Moreover, the active portfolio's relatively low Jensen's Alpha and appraisal ratio show its failure to generate sufficient excess returns over the benchmark. MPT would argue that the additional costs and risks associated with active management are not justified unless active funds generate a high enough alpha, which is not observed in this case.

4.7 Analysis of Fees and Returns

As per several studies performed by Garyn-Tal, (2013), Heaton et al., (2017) and Fahling et al., (2019), authors have concluded that fees associated with active management often outweigh the benefits of active decision-making. Heaton et al. (2019) describe how, even without fees, actively managed funds already face a significant disadvantage compared to passive funds, as they struggle to outperform the benchmark index before fees are considered. Table 6 below showcases the total expense ratio (TER), presenting mean, median, minimum, and maximum values for both portfolios. Along with TER, the table shows similar values for funds' AUM. Bogle (2014) explains in his paper that larger AUM typically leads to greater cost efficiency for index funds. Conversely, he notes that active funds often have smaller AUM, which results in higher expense ratios. The observation of Bogle is reflected in the table, where passive funds on average have larger AUM than its active peers. The larger AUM of passive funds enables them to achieve greater cost efficiency, as demonstrated by their significantly lower mean expense ratio of 0,35%, compared to the 1,49% of active portfolios.

Expense ratio	Mean	Median	Mini-mum	Maxi-mum
Total all funds (%)	1,41	1,55	0,00	3,50
Passive	0,35	0,28	0,00	1,35
Active	1,49	1,62	0,00	3,50
AUM (€M)				
All funds	422,77	178,95	5,65	7077,62
Passive	432,93	62,03	5,65	4581,41
Active	423,85	184,54	6,06	7077,62

Table 6. Expense ratio and Asset Under Management (AUM).

In the figure 13 below, the net cumulative returns are presented to illustrate how fees are affecting the performance of both portfolios. After deducting the mean expense ratio, the results reveal a clear reduction in returns for both portfolios. However, the most significant impact of fees is seen for the active portfolio, which experiences a substantial reduction in net cumulative returns. The drop in net returns further confirms findings from several papers regarding the challenges active management faces in justifying its higher expense ratios. During the research period, the passive portfolio achieved a net cumulative return of 56,75%, outperforming the active portfolio, which delivered 30,41%, by 26,34%. The effect of paying higher expenses is particularly seen after the compounding effect over time, as the active portoflio's returns lag progressively further behind. The results not only demonstrate that the passive portfolio delivered higher returns after fees but also emphasise how fees significantly diminish returns.

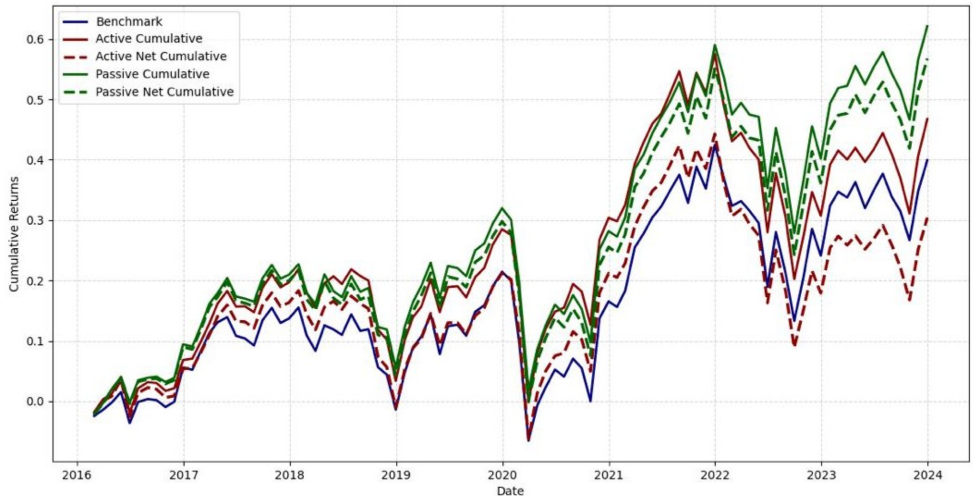

Figure 14. Net Cumulative Returns of Active and Passive Portfolios.

The significant underperformance of the active portfolio after fees reflects agency theory, where investors entrusted fund managers to act in their best interest. In this scenario, the conflict arises due to misaligned incentives. As explained by Clements (2021), misaligned incentives refer to intermediaries, or in this example, fund managers who prioritse their gain over their customers' needs. This misalignment seems to appear in several ways for the active portfolio, where fund managers charged higher fees without delivering corresponding returns or potentially engaging in closet indexing practices. Based on Clements' (2021) findings, the active funds in the portfolio may have used ESG as a justification for higher fees, which directly results in misaligned incentives where fund managers prioritise fee extraction over net investor returns. ESG integration is especially exposed to information asymmetry, as investors rely on fund managers to make decisions that align with sustainable principles. The higher fees charged by these fund managers reduce net returns, and Clements (2018) also notes that the value added by ESG research often does not justify these costs.

4.8 Regression Results

This part of the study focuses on the results obtained from factor models. First, the results of the single-factor model are shown and explained, followed by the results of the three-factor model, and concluding with the results of the four-factor model.

4.8.1 CAPM

For the single-index model, the analysis is conducted by following the principle outlined by Ibikunle and Steffen (2015), where the authors assess each portfolio separately and then perform a comparative performance analysis between portfolios using dummy variables in their regression model. In Table 7 below, a similar approach was used. The dependent variable in this table, as well as in the subsequent tables, is Alpha, which represents the intercept. MKT refers to the excess market return and captures market exposure. Adjusted R2 is included based on the approach of Ibikunle and Steffen (2015) because the adjusted value provides a more accurate measure of how well the regression model explains the variation in portfolio returns. A higher R2 indicates that the model explains a larger proportion of the variation in returns, while a lower R2 suggests that a significant portion of the variation in returns remains unexplained. The observations for this analysis use the average monthly returns. The t-statistics are shown in the parentheses and are derived from the Ordinary Least Squares (OLS) model. Asterisk *, **, and *** correspond to statistical significance levels of 10%, 5%, and 1%, respectively.

	Alpha	Mkt-Rf	Adj R2
Active	0.0097***	0.7045***	0.839
	(4.501)	(22.143)	
Passive	0.0101***	0.6880***	0.825
	(4.565)	(21.105)	

	δActive
Active versus Passive	-0.0010
	(-0.411)

Table 7. Results of Single-Factor Model.

The results of the single-factor model show that the alpha for both the active and passive portfolios is statistically significant at the 1% level. This implies that each portfolio has delivered returns above what is expected based on its market exposure. The positive and statistically significant alpha suggests that after adjusting for market risk, the portfolio is outperforming the benchmark on a risk-adjusted return basis. The same pattern is observed with the passive portfolio's alpha, which is slightly higher than 0.0101, suggesting that the portfolio has demonstrated some evidence of positive performance, albeit with a relatively small effect. In addition, both portfolios show market betas that are below 1 and highly statistically significant at the 1% level, with values of 0.7045 for the active and 0.6880 for the passive portfolio. The lower beta values of both portfolios indicate that they have market exposure but are slightly less sensitive to market movements than the overall market. The similar beta values also suggest that the active portfolio is not taking positions that are substantially different from the market, and the portfolio managers are not significantly increasing or reducing market risk relative to passive strategies. Combined with the relatively close alphas for both portfolios, this implies that the effectiveness of active management in generating excess returns is limited, as the performance does not indicate any significant deviation from the benchmark.

Both portfolios' R2 is high but not identical. The active portfolio shows a slightly better model fit, with R2 being 0.839 compared to the passive portfolio's 0.825. This indicates that the single-factor model explains a marginally greater portion of return variation for the active strategy. For the active portfolio, the relatively high R2 suggests that a substantial share of its return variation is driven by the market factor, which is somewhat unexpected given that active strategies are designed to exploit additional sources of return through active security selection. The model already captures most of the return variation, as is indicated by R2. This might suggest that there is limited room for other explanatory variables, and stock picking employed by the fund managers has not contributed significantly to returns beyond market exposure.

The difference in performance of active and passive portfolios, as indicated by δActive, is negative and not statistically significant. The result shows that there is no significant difference in performance between the two portfolios. The negative value indicates that the passive portfolio slightly outperformed the active one, but this outperformance is not strong enough to be considered statistically significant.

The results of the single-index model show similarities with the Chen and Scholtens (2018) study, where their active SRI portfolio demonstrates a lack of substantial added value from active management. Additionally, in their study, both portfolios showed similar beta values close to 1, which suggests that actively managed portfolios do not take significantly different market risks compared to passive ESG portfolios.

4.8.2 Three-Factor Model

The table below presents the results of the Fama-French three-factor model, which includes the market factor (MKT), size factor (SMB), and the value factor (HML) as explanatory variables. Additionally, the table compares the difference in alpha as δActive between the portfolios.

	Alpha	MKT	SMB	HML	Adj R2
Active	-0.0040***	0.8354***	0.5808***	0.0634**	0.944
	(-3.649)	(39.276)	(12.243)	(2.160)	
Passive	-0.0038***	0.8161***	0.3300***	0.1986***	0.921
	(-2.970)	(33.046)	(5.992)	(5.827)	
	δActive				
Active versus Passive	-0.0010				
	(-0.649)				

Table 8. Results of Three-Factor Model.

The results of the Fama-French three-factor model indicate that neither the active nor the passive portfolio generates significant excess returns beyond what is explained by the market, size, and value factors. Both portfolios exhibit statistically significant negative alphas, with the active portfolio at -0.0040 and the passive portfolio at -0.0038. With the significance level of 1% the suggestion is that on average, both portfolio types underperform relative to their risk exposures, and there is no evidence that active management leads to superior performance. The difference in alphas between the two strategies, which is -0.0010, shows no statistically significant performance advantage for either portfolio. With a corresponding t-value of -0.649, this result indicates that the active portfolio does not outperform the passive one on a risk-adjusted basis. The absence of a significant alpha difference suggests that any potential advantages from active stock selection or market timing may be offset by market efficiency and higher management costs.

Looking beyond alpha, the differences in factor loadings reveal how active and passive portfolios are positioned in relation to systematic risk factors. The active portfolio has a significantly higher loading on the size factor, with a value of 0.5808, compared to 0.3300 for the passive portfolio. Both coefficients are statistically significant at the 1% level of significance. This indicates a clear tilt toward small-cap stocks in active strategies, suggesting that managers are deliberately seeking exposure to the size premium, likely in an effort to capture higher returns by investing in companies perceived as undervalued or less efficiently priced. However, despite this stronger small-cap exposure, the active portfolio still underperforms after adjusting for risk. This implies that the size tilt alone is not sufficient to offset other potential disadvantages, such as higher fees, increased trading costs, or poor stock selection.

Additionally, the value factor (HML) is statistically significant at the 1% level for the active portfolio, indicating a modest tilt toward value stocks. Previous research has shown that while the size premium on its own can be inconsistent, it tends to strengthen the value premium when combined, particularly in small-cap stocks. Asness et al. (2018) argue that controlling for firm quality reveals a more robust size premium and that value strategies are especially effective in the small-cap segment. The significance of both SMB and HML in the active portfolio supports the view that active managers may be targeting these factors together to improve returns.

Lastly, the adjusted R2 values of both values present a substantial portion of return variation for both strategies. The higher R2 for the active portfolio suggests that its returns are slightly better explained by the model's three factors, possibly due to more deliberate factor exposures embedded in active management strategies.

4.8.3 Four-Factor-Model

The four-factor model utilises the momentum factor in addition to the three other factors. The results below in Table 9 present active and passive portfolios and their results. Table 10 uses the approach of Ibikunle and Steffen (2015) and divides the tables into two parts to assess how portfolios performed during the more stable period of 2016 to 2019 and the more volatile period of 2020 to 2023.

	Alpha	MKT	SMB	HML	MOM	Adj R2
Active	-0.0038***	0.8754***	0.5328***	0.0869**	0.0767*	0.945
	(-3.449)	(29.162)	(9.970)	(2.750)	(1.863)	
Passive	-0.0034***	0.8882***	0.2434***	0.2410***	0.1384***	0.927
	(-2.718)	(26.210)	(4.035)	(6.756)	(2.976)	
	δActive					
Active versus Passive	-0.0010					
	(-0.678)					

Table 9. Results of Four-Factor Model.

The results of the four-factor model suggest that the active portfolio does not generate statistically significant alpha beyond what is explained by the four factors. On the contrary, it appears that its performance is primarily driven by exposure to the market, size, value, and momentum factors. The results show that the active portfolio's returns are largely explained by these factors and, in fact, demonstrate that active management does not provide additional value in terms of generating excess returns.

The passive portfolio's alpha is statistically significant at the 1% level, with a value of -0.0034. Although small in magnitude, it demonstrates that the passive portfolio, like the active one, underperforms on a risk-adjusted basis. However, across all three models examined, the passive portfolio consistently shows a smaller negative alpha than the active portfolio. This relative outperformance is consistent with findings from the existing literature, which often concludes that passive strategies tend to outperform actively managed funds after accounting for costs and risk. Studies from Europe Fahling et al. (2019) and Pace et al. (2016), show the underperformance of active funds, which are consistent with the results acquired from this research.

The high market factor in both portfolios suggests that returns are strongly influenced by overall market movements, as is shown in the results of the other models. The SMB factor remains significant for the active portfolio across both the three-factor and four-factor models and shows that active managers consistently favor small-cap stocks. In the four-factor model, SMB also becomes significant for the passive portfolio, although the exposure is clearly weaker compared to the active one.

The HML factor is statistically significant in the active portfolio, with a positive coefficient indicating a moderate tilt toward value stocks. In comparison, the passive portfolio shows a stronger exposure to value. With only marginal significance at the 10% level, the momentum factor in the active portfolio suggests a weak and limited exposure to recent winners. One possible explanation for the limited momentum exposure in active funds could relate to ESG-related constraints. If fund managers prioritise sustainability, they may exclude certain high-momentum stocks that conflict with ESG criteria. As noted by Pedersen et al. (2021), the ESG-efficient frontier highlights the trade-offs between an unrestricted portfolio and one constrained by ESG objectives. These constraints can reduce potential returns by narrowing the investable universe.

For the passive portfolio, the momentum factor is statistically significant and slightly stronger than in the active portfolio, which may reflect the structural exposure to market trends inherent in broad indices. Finally, the comparison based on the approach of Ibikunle and Steffen (2015) shows that active management does not deliver superior risk-adjusted performance, even when accounting for an additional factor like momentum. This finding is consistent with the results from the three-factor model and further challenges the effectiveness of active management.

In the following table, the results for the portfolios over two timeframes are presented: Panel A covers the period from 2016 to 2019, while Panel B covers 2020 to 2023.

Panel A	Alpha	MKT	SMB	HML	MOM	Adj R2
2016-2019						
Active	-0.0037**	0.9304***	0.5698***	0.1404**	0.1216**	0.907
	(-2.460)	(18.522)	(6.973)	(2.264)	(2.067)	
Passive	-0.035*	0.9140***	0.2148**	0.3505***	0.1679**	0.859
	(-1.962)	(15.153)	(2.189)	(4.707)	(2.377)	
	δActive					
Active versus Passive	-0.0006					
	(-0.263)					

Panel B	Alpha	MKT	SMB	HML	MOM	Adj R2
2020-2023						
Active	-0.0035**	0.8515***	0.5220***	0.0658	0.0451	0.956
	(-2.086)	(20.749)	(6.931)	(1.628)	(0.762)	
Passive	-0.0044*	0.7134***	0.0343	0.0483	-0.1164	0.887
	(-1.682)	(12.970)	(0.238)	(0.615)	(-1.218)	
	δActive					
Active versus Passive	-0.0015					
	(-0.675)					

Table 10. Results of Four-Factor Model from 2016 to 2019, and 2020 to 2023.

Between 2016 and 2019, as illustrated in Panel A, both active and passive portfolios exhibited statistically significant negative alphas, indicating underperformance even after accounting for risk factors. The active portfolio recorded an alpha of –0.0037, which is significant at the 5% level, while the passive portfolio had an alpha of –0.0035, which is significant at the 10% level. However, the difference in alpha between the two strategies was –0.0006 and statistically insignificant, which gives no meaningful performance advantage from active management during this period.

Examining the factor exposures, both portfolios demonstrated strong and statistically significant sensitivity to the market factor, with loadings of 0.9304 for the active and 0.9140 for the passive portfolio. The active portfolio showed a much higher loading on the SMB factor, having 0.5698, compared to the passive portfolio's 0.2148, consistent with a strategic tilt toward small-cap stocks by active managers. Conversely, the passive portfolio had greater exposure to value stocks, with an HML loading of 0.3505, compared to 0.1404 in the active portfolio. This indicates that passive strategies were more aligned with value-oriented positions during this time. Interestingly, both portfolios demonstrated statistically significant momentum exposure, with the passive portfolio showing stronger exposure at 0.1679 compared to 0.1216 for the active portfolio. This may be due to the fact that some passive indices naturally include stocks that have recently performed well, resulting in an unintentional tilt toward momentum. The adjusted R2 values indicate that the four-factor model explains a greater proportion of return variation in the active portfolio than in the passive portfolio, which may reflect more intentional positioning by active managers toward specific risk factors.

In Panel B, the trend of negative alpha persisted. The active portfolio posted an alpha of –0.0035, significant at 5% level, while the passive portfolio's alpha declined slightly to –0.0044, significant at the 10% level. The difference in alpha was not statistically significant, which confirms the earlier finding that active management does not lead to better risk-adjusted performance. This result holds true even during periods of market disruption and structural change, such as the post-pandemic years, and suggests that active strategies are unable to consistently add value, regardless of broader economic conditions.

Factor exposures in this later period showed several shifts, as market betas declined for both portfolios, with the active portfolio at 0.8515 and the passive at 0.7134, possibly reflecting a deliberate reduction in market exposure due to increased volatility or a shift toward more defensive portfolio strategies. The active portfolio maintained significant exposure to small-cap stocks, with an SMB loading of 0.5220, while the passive portfolio's size exposure declined to an insignificant level of 0.0343. Value and momentum factors were not statistically significant for either strategy in this period, which may indicate a shift toward more neutral portfolio styles or reflect changes in which factors were driving market returns during this time. Notably, the momentum factor turned slightly negative in the passive portfolio, however, this result was statistically insignificant. As before, the model explained a greater share of return variation in the active portfolio, where R2 is 0.956, compared to 0.887 in the passive portfolio.

Lastly, across both time periods, the consistent lack of statistically significant alpha differentials, combined with similar or stronger factor exposure in passive portfolios, challenges the effectiveness of active management. Active managers appear to take on greater exposure to size risk but fail to convert that into superior returns. Meanwhile, passive strategies often capture value and momentum effects more consistently, despite operating under stricter rules and having less flexibility. These results are consistent with a broad body of literature that finds passive strategies tend to outperform on a risk-adjusted basis, particularly after accounting for costs and the difficulty of consistently timing the market or selecting outperforming stocks.

5 Conclusion

This study explores the comparative performance of actively and passively managed ESG funds domiciled in Europe and investing in European markets. The research is conducted using a dataset of funds from 2016 to 2023 and by analysing their risk-adjusted returns through performance evaluation metrics such as the Sharpe ratio, Sortino ratio, Jensen's alpha, Treynor ratio, and Appraisal ratio. In addition, by applying the CAPM single-factor model, the Fama-French three-factor model, and the Carhart four-factor model, the study evaluates the impact of market, size, value, and momentum factors on the funds' ability to achieve superior performance during stable and volatile market conditions. To conclude the study, the answers to the research question and hypotheses are presented.

1. Do actively managed ESG-focused funds offer better risk-adjusted returns and justify their higher expense ratios compared to passively managed ESG-focused funds?

The results of this research reveal no consistent evidence that actively managed ESG funds outperform their passive peers on a risk-adjusted basis. This finding is consistent with previous studies, such as those by Chen and Scholtens (2018), which found no clear performance advantage for active SRI funds. Similarly, the results support those of Pace et al. (2016), who argue that active management often fails to justify its higher fees. In this study, it became evident that the higher expense ratios of actively managed funds significantly reduce their net returns, making it difficult for them to maintain a performance advantage over passive ESG funds. Overall, the cost-efficiency of passive funds appears to outweigh the potential benefits of active management, particularly over the long term.

With evidence of higher fees, this study also confirms the results of Heaton et al. (2019), who state that higher expense ratios in actively managed funds often reduce their net performance. The table with net cumulative returns of both active and passive portfolios reveals a significant difference in performance after fees are accounted for.

Based on the performance results, it can be assessed that the findings are consistent with those of Garyn-Tal (2013), Heaton et al. (2017), and Fahling et al. (2019).

The hypotheses listed in the introduction are aimed at exploring whether the management style of ESG funds impacts their risk-adjusted performance:

H0 = There is no statistically significant difference in risk-adjusted performance between actively managed ESG funds and passively managed ESG funds.

The results of the regression models provide support for rejecting the null hypothesis. The data shows a statistically significant difference in performance, with the passive portfolio consistently outperforming the active portfolio. The negative and statistically significant alpha values observed in both the three-factor and four-factor models indicate that actively managed portfolios underperform their passive counterparts on a risk-adjusted basis.

Upon closer examination of the regression models, the results clearly indicate that passive funds consistently outperform active ones after adjusting for market, size, value, and momentum factors. In both the three-factor and four-factor models, the active portfolio showed negative and statistically significant alpha, meaning that even after accounting for common market influences like overall market movements, size, value, and momentum, the active funds still underperformed. Adding the momentum factor in the four-factor model did not improve the results for active funds, which suggests that their weaker performance was not just due to missing exposure to momentum. Additionally, the R2 values were higher for the passive portfolio, indicating that its performance was more closely aligned with the overall market and was better explained by the models. This may reflect a more consistent investment strategy and lower exposure to unsystematic risk, whereas active funds showed greater variation that was not captured by standard risk factors. Altogether, these results support the conclusion that active ESG funds in this thesis did not deliver excess returns to justify their higher costs.

Alternative hypothesis below states that actively managed portfolios deliver significantly higher risk-adjusted performance compared to passively managed portfolios.

H1 = Actively managed ESG funds provide significantly higher risk-adjusted performance compared to passively managed ESG funds.

The findings of this study do not support this hypothesis. While the active ESG portfolio showed some sensitivity to factors such as size and value, this exposure along with a general tilt toward growth stocks, did not result in superior performance. On the contrary, the active portfolio underperformed in both time periods, 2016 to 2019 and 2020 to 2023, while the passive portfolio consistently achieved better risk-adjusted returns. As a result, the alternative hypothesis is rejected.

Additionally, the active portfolio’s VaR and drawdown analysis show higher levels of risk and greater vulnerability to extreme market events compared to the passive portfolio. These findings indicate that the active portfolio not only failed to outperform but also exposed investors to higher downside risk. One of the issues why the active portfolio might experience greater vulnerability is the ESG constraint, which limits fund managers' ability to freely select stocks with less volatility due to the exclusion of certain sectors or industries that may not meet ESG criteria. This restriction reduces diversification opportunities and as a result, the active portfolio may be more sensitive to market fluctuations and specific sector risks.

These findings have clear implications for investors and fund managers. For those seeking sustainable investment options, passive ESG funds may offer a more cost-effective and lower-risk alternative, given the lack of consistent outperformance and higher downside risk observed in active ESG portfolios. Fund managers should carefully consider whether their active strategies provide enough value to justify higher fees, especially in a market that increasingly emphasises transparency and cost-efficiency. The results may also help financial advisors and regulators guide investment decisions that balance sustainability goals with performance expectations. Ultimately, the findings contribute to a broader understanding of how ESG integration affects fund performance in the European market and may offer valuable guidance for stakeholders interested in sustainable investment strategies.

The recommendations for further research include evaluating active share in ESG-focused active funds. While the performance of active funds did not justify their risk-adjusted returns, it cannot be said whether these funds underperformed due to poor fund management decisions or due to closet indexing that is present in numerous countries. Measuring active share and tracking error could help clarify whether the lack of outperformance stems from limited managerial skill or from strategies that are not truly active.

In addition, this research would benefit from analysing the performance of European active and passive ESG funds by separately examining the environmental, social, and governance components to determine whether one of these aspects is responsible for the underperformance of active funds. Expanding the scope to include other asset classes such as fixed income or mixed funds, broader geographic regions beyond Europe, or longer time horizons could also provide a more comprehensive understanding of how ESG integration interacts with fund strategy and market conditions.

Another direction for future research involves examining investor behavior and fund flows in relation to European ESG fund performance. Understanding whether investors recognize the differences between genuinely active ESG strategies and those that closely resemble passive funds could help explain investor preferences and how they influence fund selection.

References

Agapova, A., Filatova, U., & Yuk, I. (2024). Positive versus negative ESG portfolio screening and investors' preferences. *European Financial Management Association*, advance online publication.

Asness, C., Frazzini, A., Israel, R., Moskowitz, T.J. and Pedersen, L.H. (2018). Size matters, if you control your junk. *Journal of Financial Economics*. 129(3), 479–509. doi:https://doi.org/10.1016/j.jfineco.2018.05.006.

Amon, J., Rammerstorfer, M., & Weinmayer, K. (2021). Passive ESG Portfolio Management - The Benchmark Strategy for Socially Responsible Investors. *Sustainability 2021*. 13(16). https://doi.org/10.3390/su13169388

Aragon, G. O., & Ferson, W. E. (2006). Portfolio Performance Evaluation. *Foundations and Trends in Finance*. 2(2), 83–190. https://doi.org/10.1561/0500000015

Areal, N., Cortez, C.C., & Silva, F. (2010). Investing in Mutual Funds: Does it Pay to Be a Sinner or a Saint in Times of Crisis?. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.1676391

Bacha, O. (2004). Value Preservation through Risk Management – A Shariah Compliant Proposal for Equity Risk Management. *The European Journal Of Management And Public Policy*. 3(1), 65-83. https://mpra.ub.uni-muenchen.de/id/eprint/12632

Bauer, B., Koedijk, K., & Otten, R. (2002). International Evidence on Ethical Mutual Fund Performance and Investment Style. *Journal of Banking & Finance*. 29(7), 1751-1767. http://dx.doi.org/10.2139/ssrn.297882

Best, M. J. (2010). Portfolio Optimization. Chapman and Hall/CRC.

Bogle, J. C. (2014). The Arithmetic of “All-In” Investment Expenses. *Financial Analysts Journal*. 70(1), 13–21. https://doi.org/10.2469/faj.v70.n1.1

Booth, G. G., & Broussard, J. P. (2016). The Sortino Ratio and Extreme Value Theory: An Application to Asset Allocation. *Extreme Events in Finance*. 443–464. https://doi.org/10.1002/9781118650318.ch17

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*, 52, 57-82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x

Carhart, M. M. (1997). On Persistence in Mutual Fund Performance. *The Journal of Finance*. 52(1), 57–82. https://doi.org/10.1111/j.1540-6261.1997.tb03808.x

Chen, X., & Scholtens, B. (2018). The urge to act: A comparison of active and passive socially responsible investment funds in the United States. *Corp Soc Resp Env Ma*. 25, 1154-1173. https://doi.org/10.1002/csr.1529

Chissom, B. S. (1970). Interpretation of the Kurtosis Statistic. *The American Statistician*. 24(4), 19–22. https://doi.org/10.1080/00031305.1970.10477202

Clements, R. (2021). Misaligned Incentives in Markets: Envisioning Finance That Benefits All of Society. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3802178

Cohn, R.A., Lewellen, W.G., Lease, R.C., & Schlarbaum, G.G. (1975). INDIVIDUAL INVESTOR RISK AVERSION AND INVESTMENT PORTFOLIO COMPOSITION. *The Journal of Finance*. 30(2), 605-620. https://doi.org/10.1111/j.1540-6261.1975.tb01834.x

Crane, A. D., & Crotty, K. (2018). Passive versus Active Fund Performance: Do Index Funds Have Skill? *Journal of Financial and Quantitative Analysis*. 53(1), 33–64. https://doi.org/10.1017/s0022109017000904

Cremers, K. J., & Petajisto, A. (2009). How Active Is Your Fund Manager? A New Measure That Predicts Performance. *The Review of Financial Studies*. 22(9), 3329-3365. https://doi.org/10.1093/rfs/hhp057

Cremers, K. J., & Quinn, C. (2015). Do Mutual Fund Investors Get What They Pay For? The Legal Consequences of Closet Index Funds. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.2695133

Cremers, K. J., Ferreira, M. A., Matos, P., & Starks, L. T. (2015). Indexing and Active Fund Management: International Evidence. *Journal of Financial Economics*. http://dx.doi.org/10.2139/ssrn.1830207

Curtis, Q., Fisch, J.E., & Robertson, A. (2021). Do ESG Mutual Funds Deliver on Their Promises?. *Michigan Law Review*. https://ssrn.com/abstract=3839785

Dalmacio, F., & Nossa. V. (2004). The Agency Theory Applied to the Investment Funds. Brazilian Business Review. 1(1), 31-44. doi:10.15728/bbr.2004.1.1.3

Dantas, M. (2021). Are ESG Funds More Transparent?. *CGN: Corporate Social Responsibility/Corporate Citizenship*. https://doi.org/10.2139/ssrn.3269939

Dayaratne, D., Dharmaratne, D., & Harris, S. (2006). Measuring the Risk and Performance in Plantation Sector Using CAPM Based Jensen's Alpha. *Sabaragamuwa University Journal*. 6(1), 68. https://doi.org/10.4038/suslj.v6i1.1690

Doane, D. P., & Seward, L. E. (2011). Measuring Skewness: A Forgotten Statistic? *Journal of Statistics Education*. 19(2). https://doi.org/10.1080/10691898.2011.11889611

Dyck, A., Lins, K.V., & Pomorski, L. (2013). Does Active Management Pay? New International Evidence. *The Review of Asset Pricing Studies*. 3(2), 200-228. https://doi.org/10.1093/rapstu/rat005

Elton, E. J., Gruber, M. J., & de Souza, A. (2019). Are Passive Funds Really Superior Investments? *An Investor Perspective. Financial Analysts Journal*. 75(3), 7–19. https://doi.org/10.1080/0015198x.2019.1618097

Fahling, E. J., Steurer, E., & Sauer, S. (2019). Active vs. Passive Funds—An Empirical Analysis of the German Equity Market. *Journal of Financial Risk Management*. 08(02), 73–91. https://doi.org/10.4236/jfrm.2019.82006

Fama, E. (1970). Efficient Capital Markets: A Review of Theory and Empirical Work. *The The Journal of Finance*. 25(2), 383-417. doi:10.2307/2325486

Fama, E. F., & French, K. R. (1992). The Cross-Section of Expected Stock Returns. *The Journal of Finance*. 47(2), 427–465. https://doi.org/10.1111/j.1540-6261.1992.tb04398.x

Fama, E. F., & French, R. F . (1996). Multifactor Explanations of Asset Pricing Anomalies. *The Journal of Finance*. 51(1), 55-84. https://doi.org/10.1111/j.1540-6261.1996.tb05202.x

Fama, E. F., & French, R. F . (2004). The Capital Asset Pricing Model: Theory and Evidence. *Journal of Economic Perspectives*. 18(3), 25-46. DOI: 10.1257/0895330042162430

Ferris, S., & Yan, X. (2009). Agency costs, governance, and organizational forms: Evidence from the mutual fund industry. *Journal of Banking & Finance*. 33, 619-626. https://doi.org/10.1016/j.jbankfin.2008.12.003

Garleanu, N., & Pedersen, L.H. (2022). Active and Passive Investing: Understanding Samuelson's Dictum. *The Review of Asset Pricing Studies*. 12(2), 389-446. https://doi.org/10.1093/rapstu/raab020

Garyn-Tal, S. (2015) Mutual fund fees and performance: new insights. *Journal of Economics and Finance*. 39(3), 454-477. doi:10.1007/s12197-013-9257-z

Global Sustainable Investment Alliance. (2022). *Global Sustainable Investment Review*. https://www.gsi-alliance.org/wp-content/uploads/2023/12/GSIA-Report-2022.pdf

Global Sustainable Investment Alliance. (2023). *Definitions for Responsible Investment Approaches*. https://www.gsi-alliance.org/wp-content/uploads/2023/10/ESG-Terminology-Report_Online.pdf

Gonçalves T., Pimentel D & Gaio C. (2021). Risk and Performance of European Green and Conventional Funds. *Sustainability*. 13(8), 4226. https://doi.org/10.3390/su13084226

Gruber, M. J. (2024). Another puzzle: the growth in actively managed mutual funds. Annals of Operations Research. https://doi.org/10.1007/s10479-024-06247-3

Gumanti, T. A., Sutrisno, B., Andreas, A., & Bernardus, D. (2017). Empirical Study of Fama-French Three-factor Model and Carhart Four-factor Model in Indonesia. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3314684

Heaton, J. B., Polson, N. G., & Witte, J. H. (2017). Why indexing works. *Applied Stochastic Models in Business and Industry*. 33(6), 690–693. https://doi.org/10.1002/asmb.2271

Ibikunle, G., & Steffen, T. (2015). European Green Mutual Fund Performance: A Comparative Analysis with their Conventional and Black Peers. *Journal of Business Ethics.* 145(2), 337–355. https://doi.org/10.1007/s10551-015-2850-7

Jensen. M.C. (1968). The Performance of Mutual Funds in the Period 1945-1964. *The Journal of Finance*. 23(2), 389–416. https://doi.org/10.1111/j.1540-6261.1968.tb00815.x

Kaustia, M., & Yu, W. (2021). Greenwashing in Mutual Funds. *SSRN Electronic Journal*. http://dx.doi.org/10.2139/ssrn.3934004

Kenneth R. French - Description of Fama/French Factors. (n.d.). Mba.tuck.dartmouth.edu. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/f-f_developed_mom.html

Kotsantonis, S., Pinney, C., & Serafeim, G. (2016). ESG Integration in Investment Management: Myths and Realities. *Journal of Applied Corporate Finance*. 28(10-16). https://doi.org/10.1111/jacf.12169

Kreander, N., Gray, R., Power, D., & Sinclair, C. D. (2005). Evaluating the Performance of Ethical and Non-Ethical Funds: A matched Pair Analysis. *Journal of Business*

Finance & Accounting. 32(7-8), 1465-1493. DOI: 10.1111/j.0306-686X.2005.00636.x

Li, T-T., Wang, K., Sueyoshi, T., & Wang, D. (2021). ESG: Research Progress and Future Prospects. *Sustainability*. 13(21). https://doi.org/10.3390/su132111663

Lo, A. Efficient Market Hypothesis. (2007). T*HE NEW PALGRAVE: A DICTIONARY OF ECONOMICS*. https://doi.org/10.1016/S2212-5671(15)01416-1

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*. 7(1), 77-91. https://doi.org/10.2307/2975974

Matos, P. (2020). ESG and Responsible Institutional Investing Around the World: A Critical Review. *CFA Institute Research Foundation Literature Reviews*. http://dx.doi.org/10.2139/ssrn.3668998

Menezes, C., Geiss, C., & Tressler, J. (1980). Increasing Downside Risk. *The American Economic Review*. 70(5), 921–932. http://www.jstor.org/stable/1805772

Montgomery, C. A., & Singh, H. (1984). Diversification Strategy and Systematic Risk. *Strategic Management Journal*. 5(2), 181-191. http://www.jstor.org/stable/2486176

Morningstar. (2023). *Morningstar's US Active/Passive Barometer Year-End 2023*. https://assets.contentstack.io/v3/assets/blt4eb669caa7dc65b2/blt0bb206e081aa2d0e/65ef7c939b2cda20d393bd35/APB_US_2023YE.pdf

Morningstar. (2024). *ESG Fund Fees, Myth busting: ESG funds aren't more expensive than non-ESG funds.* https://assets.contentstack.io/v3/assets/blt4eb669caa7dc65b2/blt292a8df545095674/6675acbb12a787dd7a665eb3/ESG_Fund_Fees_Study_June_2024.pdf

Nofsinger, J., & Varma, A. (2014). Socially responsible funds and market crises. *Journal of Banking & Finance*. 48, 180-193. https://doi.org/10.1016/j.jbankfin.2013.12.016

Pace, D., Hili, J., & Grima, S. (2016). Active versus Passive Investing: An Empirical Study on The US and European Mutual Funds and ETFs. *Contemporary Issues in Bank Financial Management*. 97, 1–35. https://doi.org/10.1108/s1569-375920160000097006

Panda, B., & Leepsa, N. (2017). Agency theory: Review of Theory and Evidence on Problems and Perspectives. *Indian Journal of Corporate Governance*. 10(1), 74-75. doi:10.1177/0974686217701467

Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2020). Responsible investing: The ESG-efficient frontier. *Journal of Financial Economics*. 142(2), 572-597. https://doi.org/10.1016/j.jfineco.2020.11.001

Pedersen, L. H., Fitzgibbons, S., & Pomorski, L. (2021). Responsible Investing: The ESG-efficient Frontier. *Journal of Financial Economics*, *142*(2). https://doi.org/10.1016/j.jfineco.2020.11.001

Peng, L. S., & Isa, M. (2020). Environmental, Social and Governance (ESG) Practices and Performance in Shariah Firms: Agency or Stakeholder Theory? *Asian Academy of Management Journal of Accounting and Finance*, *16*(1), 1–34. https://doi.org/10.21315/aamjaf2020.16.1.1

Perold, A. F. (2004). The Capital Asset Pricing Model. *Journal of Economic Perspectives*. 18(3), 3–24. https://doi.org/10.1257/0895330042162340

Reiser, D.B., & Tucker, A.M. (2019). Buyer Beware: Variation and Opacity in ESG and ESG Index Funds. *Cardozo Law Review*. 41. http://dx.doi.org/10.2139/ssrn.3440768

Rompotis, G. G. (2009). Active vs. Passive Management: New Evidence from Exchange Traded Funds. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1337708.

Rudd, A. (1981). Social Responsibility and Portfolio Performance. *California Management Review*. 23(4), 55–61. https://doi.org/10.2307/41164931

Schanzenbach, M. M., & Sitkoff, R. H. (2020). ESG Investing: Theory, Evidence, and Fiduciary Principles. *Journal of Financial Planning*.

SEC Adopts Amendments to Modernize Fund Shareholder Reports and Promote Transparent Fee- and Expense-Related Information in Fund Advertisements. U.S. Securities and Exchange Commission. (2022). https://www.sec.gov/newsroom/press-releases/2022-193

Sharpe, W. F. (1991). The Arithmetic of Active Management. *Financial Analysts Journal*. 47(1), 7–9. https://www.jstor.org/stable/4479386

Soohun, K., & Aaron, Y. (2022) Analyzing Active Fund Managers' Commitment to ESG: Evidence from the United Nations Principles for Responsible Investment. *Management Science*. 69(2), 741-758. https://doi.org/10.1287/mnsc.2022.4394

Sorensen, E.H., Miller, K.L., & Samak, V. (1998). Allocating between Active and Passive Management. *Financial Analysts Journal*. 54(5), 18-31. https://doi.org/10.2469/faj.v54.n5.2209

Sortino, F. A., & Price, L. N. (1994). Performance Measurement in a Downside Risk Framework. *The Journal of Investing*. 3(3), 59–64. https://doi.org/10.3905/joi.3.3.59

Srivastava, P., & Mazhar, S. S. (2018). Comparative Analysis of Sharpe and Sortino Ratio with reference to Top Ten Banking and Finance Sector Mutual Funds. *International Journal of Management Studies*. (4(2), 93. https://doi.org/10.18843/ijms/v5i4(2)/10

Stambaugh, R.F., Lins, K.V., & Pomorski, L. (2019). Skill and fees in active management. *National Bureau of Economic Research*.

STOXX. (n.d.). STOXX Europe 600. Retrieved 2024-11-19 https://stoxx.com/index/sxxp/

Swiss Sustainable Finance. (2020). Sustainable Asset Management: Key Messages and Recommendations of SFAMA and SSF. https://www.sustainablefinance.ch/upload/cms/user/EN_2020_06_16_SFAMA_SSF_key_messages_and_recommendations_final.pdf

Tailored Shareholder Reports for Mutual Funds and Exchange-Traded Funds; fee information in investment company advertisements. U.S. Securities and Exchange Commission. (2022). https://www.sec.gov/resources-small-businesses/small-business-compliance-guides/tailored-shareholder-reports-mutual-funds-exchange-traded-funds-fee-information-investment-company

Taylor, J. (2004). A note on closet-indexing. *Journal of Economics and Business*. 56(6), 431-441. https://doi.org/10.1016/j.jeconbus.2004.03.005

The SDGs and the UN Summit of the Future. (2024). *Sustainable Development Report*. https://s3.amazonaws.com/sustainabledevelopment.report/2024/sustainable-development-report-2024.pdf

Titan, A. (2015). The Efficient Market Hypothesis: review of specialized literature and empirical research. *Procedia Economics and Finance*. 32, 442-449. https://doi.org/10.1016/S2212-5671(15)01416-1

Torri, G., Giacometti, R., Dentcheva, D., Rachev, S. T., & Lindquist, W. B. (2023). ESG-coherent risk measures for sustainable investing. https://doi.org/10.48550/arXiv.2309.05866

Trends in the Expenses and Fees of Funds. (2023). *ICI Research Perspective*. https://www.ici.org/system/files/2024-03/per30-02.pdf

Treynor, J.L. (1965). How to Rate Management of Investment Funds. *Harvard Business Review*. 43(1), 63-75.

Wang, Y. (2017). Appraisal Ratio and the Mutual Fund’s Stock Picking Skill. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.3201993

Warren, G., & Foster, F. (2015). Why Might Investors Choose Active Management?. *Journal of Behavioral Finance*. 16. 10.1080/15427560.2015.1000331