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Risk and Performance Analysis of Conventional and Sustainable Mutual Funds in Europe and ASEAN

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Master in International Management

Supervisor:
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ISCTE Business School

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BUSINESS
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Department of Marketing, Strategy and Operations

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Resumo

Com a maior atenção dada a práticas empresariais mais sustentáveis, os investidores começaram a afetar o seu capital às empresas com melhores desempenhos ESG ou sustentáveis. A propagação da COVID-19 desencadeou uma crise financeira recente, levando os investidores a encarar o investimento sustentável como uma alternativa mais segura do que as suas contrapartes convencionais. Os investigadores neste domínio têm realizado um número crescente de estudos utilizando vários métodos, tais como o desenvolvimento de uma carteira optimizada, a avaliação de índices sustentáveis e a comparação do desempenho, do risco e do desempenho ajustado ao risco das opções de investimento sustentável.

Esta tese complementa a investigação existente, analisando as tendências dos fundos de investimento que estão a incorporar ESG nos seus fundos e calculando o retorno, o risco e o retorno ajustado ao risco dos fundos sustentáveis e convencionais em diferentes regiões e períodos de tempo. Selecionámos a Europa e a ASEAN para melhorar a nossa compreensão das distinções entre mercados desenvolvidos e em desenvolvimento para o investimento sustentável.

Os resultados indicam que se regista um crescimento claro e significativo dos fundos com a temática ESG em comparação com os fundos não ESG em ambas as regiões. No entanto, em termos de desempenho dos fundos, risco e retorno ajustado ao risco, não existe uma diferença estatisticamente significativa entre os fundos sustentáveis e os fundos convencionais na Europa e nos países da ASEAN, exceto num período específico.

Palavras-chave: Fundos de Investimento, Investimento Sustentável, Desempenho dos Fundos, Rácio Risco-Retorno
JEL: G11

Abstract

With the increased focus on more sustainable business practices, investors started to allocate their capital towards those with better ESG or sustainable performances. The spread of COVID-19 triggered a recent financial crisis, prompting investors to view sustainable investment as a safer alternative to its conventional counterparts. Researchers in this field have conducted a growing number of studies using various methods, such as developing an optimized portfolio, evaluating sustainable indexes, and comparing the performance, risk, and risk-adjusted performance of sustainable investment options.

This thesis adds to the existing research by looking at the trends of mutual funds that are incorporating ESG into their funds and calculating the return, risk, and risk-adjusted return of both sustainable and conventional funds in different regions and time periods. We select Europe and ASEAN to enhance our understanding of the distinctions between developed and developing markets for sustainable investment.

The results indicate that there is a clear and significant growth of ESG-themed funds compared to non-ESG funds in both regions. However, in terms of fund performance, risk, and risk-adjusted return, there is no statistically significant difference between sustainable funds and conventional funds in Europe and ASEAN countries, except for a specific period of time.

Keywords: Mutual Funds, Sustainable Investment, Fund's Performance, Risk-Return Ratio
JEL: G11

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Contents

Resumo i
Abstract ii
Contents iv
List of Figures vii
List of Tables vii
List of Abbreviations viii
1 Introduction 1
2 Literature Review 4
3 Trend and Performance Analysis 10
3.1 Funds' Trends Analysis 10
3.2 Portfolio Performance 11
4 Methodology and Data 13
4.1 Screening for Funds 13
4.2 Trend Analysis 14
4.3 Performance Analysis 15
4.4 Collected Data 15
5 Analysis of Results 18
5.1 ESG Trend 18
5.2 Fund's Performance 20
5.3 Discussion 26
6 Conclusion 30
References 32
Appendix A Sustainable Funds Descriptive Statistics 35
Europe 35
Annualized Return 35
Annualized Monthly Standard Deviation 35
Sharpe Ratio 35
Treynor Ratio 36

Indonesia 36
Annualized Return 36
Annualized Monthly Standard Deviation 36
Sharpe Ratio 37
Treynor Ratio 37
Malaysia 37
Annualized Return 37
Annualized Monthly Standard Deviation 38
Sharpe Ratio 38
Treynor Ratio 38
Thailand 39
Annualized Return 39
Annualized Monthly Standard Deviation 39
Sharpe Ratio 39
Treynor Ratio 40
Appendix B Non-Sustainable Funds Descriptive Statistics 41
Europe 41
Annualized Return 41
Annualized Monthly Standard Deviation 41
Sharpe Ratio 41
Treynor Ratio 42
Indonesia 42
Annualized Return 42
Annualized Monthly Standard Deviation 42
Sharpe Ratio 43
Treynor Ratio 43
Malaysia 43
Annualized Return 43
Annualized Monthly Standard Deviation 44
Sharpe Ratio 44
Treynor Ratio 44

Thailand....45
Annualized Return....45
Annualized Monthly Standard Deviation....45
Sharpe Ratio....45
Treynor Ratio....46

List of Figures

Figure 5.1 ESG Funds AUM Comparison 18
Figure 5.2 Conventional Funds AUM Comparison 18
Figure 5.3 Number of ESG Funds from 2016 until 2023 19
Figure 5.4 Number of Conventional Funds from 2016 until 2023 20

List of Tables

Table 3.1 ESG funds investment strategy 10
Table 3.2 Description of screening strategy 11
Table 4.1 Screening criteria applied in Refinitiv 14
Table 4.2 Number of funds after data cleaning as of 2023 16
Table 5.1 Funds AUM Growth from 2016 to 2023 19
Table 5.2 Average yearly return 21
Table 5.3 Average annualized monthly standard deviation 22
Table 5.4 Average yearly Sharpe ratio 24
Table 5.5 Average yearly Treynor ratio 25

List of Abbreviations

ASEAN – Association of South East Asian Nation

AUM – Asset under Management

bps – Basis Points

CAPM – Capital Asset Pricing Model

ESG – Environment, Social, and Governance

ETF – Exchange Traded Fund

EU – European Union

FY – Fiscal Year

GSIA – Global Sustainable Investment Alliance

JII – Jakarta Islamic Index

LQ45 – Liquid 45

NAV – Net Asset Value

NGO – Non Governmental Organization

OECD – Organisation for Econnomic Co-operation and Development

SRI – Sustainable and Responsible Investment

UNPRI – United Nation Principles for Renewable Investment

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1 Introduction

Research and discussion on business sustainability have been ongoing for a long time, and the occurrence of global events in recent decades has intensified these concerns. Consider the 2008 global financial crisis, which resulted from a combination of loose monetary regulation and inadequate risk management (Mohan, 2009), the 2015 Paris Agreement, which aimed to limit the rise of global average temperature, and the 2019 global pandemic of COVID-19, which led to global lockdown, travel and mobility restrictions, and ultimately, an economic crisis. These events are accelerating the transformation process and increasing the use of comprehensive measures in an attempt to ensure business practices with better governance, environmental sustainability, and social responsibility (Dmuchowski et al., 2023). On the other hand, these events have heightened investor concerns about the businesses they are investing in. Other than the big worldwide events mentioned before, there is also some personal drivers that help increase the number of investors and the amount of money invested in this asset class. Morgan Stanley (2024) stated in their Sustainable Signals report that the drivers vary, such as the economic benefit from superior financial performance, supporting evidence from researchers regarding climate change and benefits of environmental sustainability practices, and a way of managing risk in a volatile and dynamic market.

The current research and body of knowledge in sustainable investment have grown significantly, covering not only the relationship between sustainability and financial performance but also how to use it in an attempt to manage the risk of an asset or portfolio. Before we delve deeper into this research, it is crucial to acknowledge the use of ESG as a proxy for asset sustainability. The Swiss Federal Department of Foreign Affairs and United Nations introduced the term ESG in their 2004 Global Compact report. We can interchangeably use terms such as ESG, sustainable investment, responsible investment, and socially responsible investment (GSIA, 2021). The research includes investments with religious value, such as Christian or Islamic investments, as an additional means of identifying sustainable themed investments.

The studies on sustainable-themed investment are mixed. Numerous studies have looked into the effect of a firm's ESG rating on its financial performance, and the outcomes vary from one to another. There is a positive correlation between a higher ESG rating and improved financial performance, though some research shows there is no significant correlation, either positive or negative, between ESG and financial performance. Additionally, other research

shows that a higher ESG rating can result in a decrease in financial return. The findings regarding sustainable themed equity portfolio investment do not significantly differ, as all three outcomes are visible (Jain et al., 2023).

Mutual funds and ETFs are two of the many options available for individual investors to invest their money in the market. These investments offer straightforward access to a diversified portfolio and thematic investment, such as sustainable or high ESG funds. The growing number of retail investors worldwide, growing interest in thematic or sustainable investment, and increased financial literacy on risk and diversification have elevated these alternatives to the top of the list for new investors. This does not necessarily mean that investment and fund managers are the best at choosing and composing portfolios, resulting in a well-optimised portfolio (high risk-return ratio). In addition to that, mutual funds are more widely available, especially in developing markets such as Indonesia, Malaysia, and Thailand.

With that understanding, I wanted to look at how mutual funds performed historically. This thesis will look into the general information of mutual funds available in the market, such as the value invested and the number of funds active in the market. Additionally, this thesis will examine the historical performance of the funds, comparing them to traditional or non-ESG funds during both normal and crisis times. The performance comparison will use the Sharpe and Treynor ratios to get a more comparable result between funds. Geographical constraints will limit the collected information, as my focus will be on the European and ASEAN markets. Currently, Europe is the largest market for sustainable investment, and the market is considered to be more mature in terms of identification, definition, regulation, and access to information (transparency), which makes it a suitable benchmark in today's conditions. Indonesia maintains its status as a developing economy. Despite the expectation of Indonesia becoming the fourth largest economy by 2045, the journey towards a mature, regulated, and transparent sustainable investment market remains lengthy (Hawksworth et al., 2017). This implies the importance for the Indonesian government to start formulating and developing the ecosystem as soon as possible so that, by the time the Indonesian economy reaches its peak, the ecosystem to support and manage sustainable investment is ready, if not matured.

Analysing the trend in Europe and ASEAN helps uncover the current market condition for sustainable investment. Given the ever-growing importance of sustainable business practices and environmental targets from global agreements such as the Paris Agreement, looking into this matter has never been more important. Furthermore, the writer expects that a comparison between the ASEAN and European markets will shed light on the characteristics of a mature, regulated, and transparent market for sustainable investment.

Four other sections comprise this thesis. Section 2 presents existing literature and studies that serve as the theoretical foundation for this study. Section 3 delves into the details of measuring the funds' performance. Section 4 provides information on the methodology and the data used in this study. Section 5 will present the analysis of the results, and Section 6 presents the conclusion and discusses the economic implications of the thesis' outcome.

2 Literature Review

Globally, sustainable investment had reached $30 trillion by the end of FY 2022 (GSIA, 2023), over 10,000% increase since 2012, and a 20% increase since 2020. The number is noticeably lower than the forecasted total AUM of approximately $120 trillion by 2022, which makes the target of implementing almost 100% of ESG integration in fund management by 2036 go behind schedule (Uzsoki, 2020). However, there have been several adjustments to the current total AUM of sustainable investment. These adjustments, though they may decrease the total AUM of sustainable investment in the region, were signs of a more established and matured global environment. Furthermore, the global COVID-19 pandemic causes a global economic contraction and impedes growth in every market.

While the absolute value of reported sustainable investing assets grew in most regions, it fell short of the broader market growth pace in Europe and Canada, leading to a decline in the proportion of sustainable investment assets. At the same time, Japan and the Australian & New Zealand markets are showing an increased portion of sustainable investment assets in the market (GSIA, 2023).

These absolute growths are supported by both institutional investors, such as pension funds, and retail investors; though the portion of sustainable mutual funds in Canada, the UK, and China may be small, their growth is substantial. While institutional investors were trying to benefit from incentives given by investing and complying with sustainable investing guidelines, there is also significant demand for pension funds to allocate more towards responsible, ethical, and impactful investment. Furthermore, to reach potential investors interested in sustainable investing, mutual funds have been pushing more products within the themes of sustainability and climate change (GSIA, 2023).

There are various drivers for the increasing demand for ESG-related investment options, especially at the individual level of retail investors. Riedl and Smeets (2017) try to understand why investors, specifically in the Netherlands, hold socially responsible mutual funds. They find that while financial performance may be driving more investors to put their money into SRI investments, they work alongside social drivers. The investor's desire to do well while doing good plays the biggest role in deciding whether or not they will invest in SRI funds, followed by the desire to look or be perceived as good. The performance of SRI funds is not significantly different from that of non-SRI funds, indicating that financial performance is not

the primary driver of investment decisions. Interestingly, the less risk-averse the investor, the more likely they are to invest in SRI funds.

In Asia, investors choose sustainable investments over conventional ones due to a variety of factors. Gutsche et al. (2021) look into Japan, one of Asia's most developed sustainable markets. Investors are less likely to invest due to non-financial-related factors such as personal attitudes and values towards sustainable investment. Individual financial literacy, financial performance, and investor risk preferences are the determinants of sustainable investment. The same goes for Indonesia. The impact of sustainable investment on financial return and risk level primarily influences young Indonesian investors (Lestari and Wiryono, 2023). However, both countries still need to nurture individual investor literacy to increase the prevalence of choosing sustainable investment over conventional investment.

With increasing market interest, there are a plethora of sustainable investment options for investors to choose from. Ranging from green bonds, project-based funds, and Sustainable Index ETFs, each has an additional sub-class for investors to choose from. Alternatively, investors can choose to make a sustainable investment portfolio with either a combination of several asset classes or just one asset class, such as ESG-rated equities.

Out of all the offered options, mutual funds and ETFs are the only ones that offer the benefits of portfolio diversification. Both mutual funds and ETFs offer a portfolio consisting of equities, which can be ESG-rated, non-ESG, a combination of both, or even a blend of multiple asset classes. The differences between each are as follows: ETFs are more transparent in disclosing the composition of their portfolio, whereas mutual funds typically only disclose a portion (usually 10) of the largest asset they invest in; ETFs can be traded like equities in exchange, whereas mutual funds can only be traded at the closing price at the end of the day; and finally, ETFs primarily aim to match the performance of an index, whereas mutual funds aim to outperform the market or benchmark index.

With that in mind, it is clear that even though attitudes towards sustainable investment performance may differ between the European and Asian markets, it still affects whether or not investors will choose to put their money into it. While a direct comparison of their returns may appear to be a simpler method, it may not capture the full picture. There is growing research on how sustainable investment options perform financially in comparison to conventional investment options, which have varying results.

These findings serve as the basis for my first research question.

1. *What is the current trend of ESG-related investment funds in Europe and ASEAN?*

Furthermore, one of the most cited works in this field is Renneboog et al. (2008), which compares the performance of SRI-rated funds with conventional (non-SRI) funds measured with the Fama-French-Carhart model. Their universe of funds spans multiple geographical locations such as Europe, North America, and Asia-Pacific between 1991 and 2003. They found that most funds have a negative risk-adjusted alpha, and both SRI and conventional funds were underperforming the benchmark. At the same time, the difference between SRI and conventional funds is not statistically significant. Though they were underperformed, a different strategy to compose the funds may lead to different financial performance, as more stringent requirements may give fewer options for the funds. Furthermore, the size of the funds did not affect their performance; rather, it was the fund's management that could significantly reduce its risk-adjusted returns. Finally, changing market demand and time-varying risk loading have the potential to cause the risk-adjusted return to be lower than the benchmark.

Prol and Kim (2022) use the Markowitz mean-variance framework to create an optimised equity portfolio that depends on the NYSE ESG scores between 2018 and 2019. They then evaluate portfolio performance in terms of risk using the measure of volatility and return, as well as the Sharpe ratio. While they quote that “many financial institutions claim that ESG factors can benefit portfolio risk and return," the evidence they found was not supportive. The results they found indicate that although a portfolio with a high ESG rating has lower volatility, its return is even lower. Thus, the Sharpe ratio of these portfolios demonstrates a lower risk-adjusted return in comparison to the portfolio with a lower ESG rating.

According to Prol and Kim, the portfolio should expect the previously described outcome if it solely focuses on high ESG-rated stocks. However, incorporating low ESG-rated stocks into the portfolio can enhance its return and significantly reduce its volatility. This is attributed to the distinct return characteristics of low ESG-rated stocks. This, in turn, led to improved risk-adjusted performance (Prol and Kim, 2022).

Dreyer et al. (2023) look into the effect of ESG on portfolio returns in the US stock market using two different sources of data, MSCI and Reuters, between 2002 and 2020. The rating used by the two providers gives different measures of the risk-adjusted performance of the portfolio created. While the beta measures did not differ, the alphas did. The results of either under- or out-performance were not aligned with each other, depending on the specific ESG criteria used. This highlights a problem with ESG rating providers, as their criteria may not be comparable to one another. Moreover, the research shows that the beta of the ESG portfolio has lower systematic risk (beta) compared to the neutral portfolio. Over time, the demand for sustainable or ESG-rated companies grew, fuelling the price and increasing its volatility.

However, there was no indication of catching up, resulting in the market's outperformance over the ESG portfolio.

Zehir and Aybars (2020) also examine the performance of the ESG portfolio using the European and Turkish markets, and their findings support the efficient market hypothesis, which holds that the price of an asset already reflects all information that may affect its price. They found differing results when using the CAPM and Fama-French three-factor models for performance measurement. They created the portfolios by ranking the stocks according to their ESG rating and categorising them into the top 10% and bottom 10%. Calculations using the CAPM provide results indicating that the two portfolios were underperforming in the market. However, measurements using the Fama-French three-factor model yield a statistically significant outperformance of around 0.5% excess return from the market. These contrasting results lead to the aforementioned conclusion.

Naffa and Fain (2020) also conclude the hypothesis of efficient market theory in terms of ESG investment; there is no added idiosyncratic risk when companies align their strategies with ESG, and ESG did not cause under-diversification caused by restricted investment options. They discovered that the positive alphas of ESG investment were significant, and they still hold even when combined with 50 bps transaction costs. Naffa and Fain mention that the fact some investors were able to withstand the high cost of investing in a more costly ESG investment may indicate two things: (1) ESG investors are willing to sacrifice a bit of their return for the sake of doing good, or (2) the cost will eventually get lower and reach the 50 bps/annum or less.

Lee et al. (2021) conducted their research on SRI funds by creating a simple portfolio that replicates a simple self-managed index fund in Australia. The measurements used are the Carhart model, Sharpe ratio, annualised return and risk (standard deviation), and portfolio beta. Though they find that the high-rated SRI funds do not significantly outperform or underperform the market portfolio, they find no evidence for the argument that a high-rated ESG portfolio affects returns negatively and limits diversification opportunities. A lower SRI-rated portfolio demonstrated the opposite effect. The efficient market theory, which is robust across different periods, market cycles, and seasonality, aligns with their findings.

Jain et al. (2023) use the stocks in India’s largest and most liquid floating securities, the Nifty, as the market benchmark to compose an ESG index. Ratios such as Sharpe and Treynor, CAPM, and annualised standard deviation are used as performance measurements. They conclude that the ESG index contains a lower risk level compared to a conventional index.

Furthermore, the ESG Index's risk-return ratio (the Sharpe and Treynor ratio) was higher, indicating a better risk payoff for investors.

Guimarães and Malaquias (2023) conducted another study in Brazil that yielded mixed results. With a sample of more than 3,000 funds from 2006 to 2020, they find supporting evidence for their hypothesis on the outperformance of SRI funds to their conventional peers during a crisis period. During the non-crisis period, however, they found no supporting evidence that SRI funds have indifferent performance compared to conventional funds. This different risk-adjusted performance in different economic cycles is similar to Renneboog et al. (2008) study of time-varying risk-loading due to changes in economic conditions and market timing, which may affect the funds' performance.

In Indonesia, the research and environment for sustainable investment is still growing and not as developed as in Europe, the USA, or other parts of Asia, like Japan. Angelica and Utama (2020) are a few of the researchers who have looked into this topic. They compare the performance of portfolios made up of stocks listed in the SRI index, the LQ45 index (which consists of the 45 most liquid stocks), and the JII index (Jakarta Islamic Index). They measure the performance by calculating their Jensen's alpha and several risk-return ratios, such as the Sharpe ratio, Treynor ratio, and Sortino ratio. They found that while SRI investment has a higher risk (measured by beta) compared to the conventional and Islamic index, it has a better return, shown by a higher risk-return ratio and a smaller negative alpha during the study period of 2014 to 2019.

Alvarez-Perez et al. (2024) examine the benefits of including ESG index stocks in the portfolio in the Latin-America (LA) market, as well as their risk-adjusted performance compared to a conventional index. They found that the ESG index in LA countries, namely Brazil, Mexico, Chile, Peru, and Columbia, has varying results between nations and time periods. During the time of financial distress, the pandemic year of 2020, each country's ESG indices also gave a different market response. Conversely, following the COVID-19 period, we observed an improvement in all markets' risk-reward ratio. While the indices may have mixed performance measures, incorporating the ESG index into the portfolio alongside conventional indexes has proven to have a favourable outcome in terms of its risk-adjusted return.

Sládková et al. (2022) look into the sustainable and responsible investment fund environment in Europe. They discovered that SRI may have the ability to perform better than their conventional counterpart, but their return was more volatile and occurred over a shorter period. In her research, Sládková et al. cited several publications on the trends of sustainable investment. While the trends in sustainable investment are promising, one of which is the

largely positive relationship between ESG and financial performance, the market is also becoming more complicated with increasing variation in its application and scope of category. Alvarez-Perez et al. (2024)—quoting Galbreath (2013) and Odell and Ali (2016)—mentioned the likelihood of different performances in different geographical locations during the global adoption of ESG strategy. These studies on fund performances inspired me to formulate my second research question:

2. *How do ESG-related funds perform compared to the conventional funds in Europe and ASEAN?*

The majority of published studies measure the performance of ESG or SRI portfolios using either an index or an optimised portfolio, indicating a lack of fund-based research. This is not without reason. Dreyer et al. (2023) mentioned several nonquantifiable aspects that prevent them from using funds in ESG portfolio performance research. Most, if not all, mutual funds do not disclose their portfolio's composition, and oftenly investors only know the top 10 assets within the portfolio. Although the funds disclose their approach or strategy for portfolio building, their screening methods may not align with the widely accepted definition, as outlined by UN PRI (2023). The fund manager's unknown and different capabilities further make it an uncontrollable variable when comparing each fund. Opposing this idea, Renneboog et al. (2008) stated that funds may provide the most suitable setting in studying the significance of ESG or SRI strategies from the economic point of view, which is the focus of this thesis. Renneboog et al. (2008) assumed that investors in such funds pursue both wealth maximisation and social values simultaneously. Doing well while doing good.

3 Trend and Performance Analysis

This chapter will explore the methods for measuring the trend and performance of ESG-related funds. The measures chosen were based on similar research discussed in the Literature Review.

3.1 Funds' Trends Analysis

As reported by the Global Sustainable Investment Alliance (GSIA) in their 2022 report, the amount of money invested in ESG-related funds globally has increased since the inception day of GSIA (GSIA, 2023). Over time, changes in the criteria used to identify ESG in each region have resulted in significant fluctuations. Moreover, GSIA offers insights into the strategies employed by funds—as shown in **Table 3.1**—and their respective values. This thesis will replicate the trend analysis of GSIA's report, focussing on mutual funds in Europe and ASEAN.

We will use several metrics to analyse the trends:

1. Assets under management (AUM),
2. Amounts of registered funds,

Table 3.1 ESG funds investment strategy

Approach	**Definition**
Screening	Applying rules based on defined criteria that determine whether an investment is permissible.
ESG Integration	Ongoing consideration of ESG factors within an investment analysis and decision-making process to improve risk-adjusted returns.
Thematic investing	Selecting assets to access specified trends.
Stewardship	The use of investor rights and influence to protect and enhance overall long-term value for clients and beneficiaries, including the common economic, social, and environmental assets on which their interests depend.
Impact Investing	Investing to generate positive, measurable social and/or environmental impact alongside a financial return.

Note: Adapted from *Global Sustainable Investment Review 2022*, by GSIA, 2023.

We will primarily retrieve the data from Bloomberg, Reuters, and other data sources, including the relevant country exchange commission. We will collect additional metrics or variables based on Sládková et al. (2022) to identify the funds. We will use these metrics to investigate the trends and scope of ESG mutual funds in Europe and ASEAN.

One of the issues with ESG investment is its broad definition. The scope of ESG investment in one region may differ from another. GSIA's periodical report on sustainable investment takes notes on several changes in each region's definition, leading to either an increase or decrease in the total amount of sustainably invested assets globally. The same goes for the definitions of responsible investment approaches used to categorise the investment strategy. UNPRI published a definition in November 2023, compiling definitions from various institutions like the CFA Institute, GSIA, PRI, and others, including GSIA's 2022 investment review.

The screening approach consists of three different methods, as mentioned in **Table 3.2**.

Table 3.2 Description of screening strategy

Screening Approach	**Definition**
Norms-based Screening	Screening of investments against minimum standards of business or issuer practice based on international norms such as those issued by the UN, ILO, OECD and NGOs (e.g. Transparency International).
Negative/ Exclusionary Screening	The exclusion from a fund or portfolio of certain sectors, companies, countries or other issuers based on activities considered not investable. Exclusion criteria (based on norms and values) can refer, for example, to product categories (e.g., weapons, tobacco), company practices (e.g., animal testing, violation of human rights, corruption), or controversies.
Positive/ Best in Class Screening	Investment in sectors, companies, or projects selected for positive ESG performance relative to industry peers, and that achieve a rating above a defined threshold.

Note: Adapted from *Global Sustainable Investment Review 2022*, by GSIA, 2023.

3.2 Portfolio Performance

The change in funds value can be used as a measure of the funds return, just like any other asset. Depending on the type of funds—ETFs, closed-ended funds, or open-ended funds—the value of interest for the calculation will be different. Since both ETFs and close-end funds trade on the open market, we will measure them using their trading price, whereas we will measure open-end funds using their NAV. These measures will then be used to calculate the necessary ratios and variables. There are several approaches to calculating and measuring portfolio financial performance. Some of these methods were also utillised in the literature review,

including portfolio variance or standard deviation; risk-to-reward ratios such as Sharpe and Treynor ratios; and Jensen's alpha. There are several other measures mentioned in the literature, such as a more sophisticated Fama-French three-factor and five-factor model, the Sortino ratio, and Dimson beta. However, this thesis will solely utilise the portfolio standard deviation, Sharpe ratio, and Treynor ratio to assess the portfolio performance.

Standard deviation measures the total risk within the asset based on the occurrence of price variation and how far it deviated from the asset mean price. We will use this measure to calculate the Sharpe ratio, which takes the risk-free rate from the corresponding market government treasury bonds and calculates the mean difference between the portfolio return and the risk-free rate **(Eq. 3.1)**. We should match the period for each market mean return, risk-free rate, and standard deviation.

In comparison with the Sharpe ratio, the Treynor ratio divides the difference between portfolio return and risk-free rate with the portfolio beta **(Eq. 3.2)**. Beta measures the risk of the portfolio according to how it moves with the market, or its systematic/market risk. The difference in the denominator in both equations also implies different assumptions. Quoting from Angelica and Utama (2020), "standard deviation in the Sharpe ratio means that the portfolio is not well-diversified. This is because the denominator, or measure of risk, is the total risk, which includes both systematic and non-systematic risk." Angelica and Utama (2020) also mentioned that "the Treynor ratio, which assumes a well-diversified portfolio only exposed to systematic risk, uses the market or systematic risk as its measure of risk." We hoped to accommodate the unknown nature of funds, which have minimal disclosure from their constituents, by using these two different risk-return ratios. For investors, it is almost impossible to fully identify the composition of funds since they only disclose some of their biggest investment portions and do not fully expose the whole portfolio. Therefore, it remains unclear how diversified the portfolio is.

$$Sharpe\ Ratio = \frac{\overline{R_p} - \overline{R_f}}{\sigma_p}$$

(Eq. 3.1)

$$Treynor\ Ratio = \frac{\overline{R_p} - \overline{R_f}}{\beta_p}$$

(Eq. 3.2)

4 Methodology and Data

This thesis has the following objectives:

1. Expand the literature related to mutual funds that used SRI or ESG-related strategies.
2. Provide insights on the trends and significance of SRI or ESG strategies for mutual funds in Europe and ASEAN.
3. Provide an international comparison of mutual fund risk and risk-adjusted performance.

To accomplish the objectives, several steps need to be taken, which will be explained in the next subsection.

4.1 Screening for Funds

We will retrieve the funds' data from Reuters. The screening process of the funds started by filtering the funds within the Reuters Funds universe. Renneboog et al. (2008) and Guimarães and Malaquias (2023) used the same approach of applying filters before acquiring the information related to the funds. **Table 4.1** displays the filters used in this thesis, after some adjustments. This filtering process will result in 209 mutual funds for the first geographic focus (Europe) and 84 mutual funds for the second geographical focus (ASEAN countries).

Applying the given restriction to the Reuters funds universe generates a report that provides the Lipper ID of the funds, their names, the currency used, and their approaches to portfolio composition. The Refinitiv Eikon feature inMs.Excel then retrieves each fund's monthly net asset value (the fund's value per share, abbreviated as NAV) and monthly assets under management (AUM). We obtain the information regarding conventional funds using the same steps and process, but with a slight change in the fund's characteristics. We set the asset name for conventional funds to exclude the SRI fund criteria, while the other criteria remain unchanged.

To retrieve information on the conventional funds, the criteria used are the same as shown in **Table 4.1**, except for two things: We do not use the assets in the screening process; instead, we use the previously acquired list of ESG funds as an exclusion criterion to prevent their inclusion in the conventional fund screening. Not all funds were operational from 2016 to 2023 when we acquired the data, necessitating further data trimming. The trimming process resulted in 1969 funds for the first geographic focus and 662 for the second geographic focus.

Table 4.1 Screening criteria applied in Refinitiv

Fund's Characteristic	**Definition**	**Filters**
Funds Primary	Only listed the primary funds and not the whole fund family	Primary
Fund's Type	The type of funds that will be included in the result	Mutual funds
Asset Type	The asset composition of the funds should only contain assets in this category	Equity
Geographical Focus	Funds whose assets were focused or invested in the company within these countries	Europe, Eurozone, Western Europe, and the 27 countries of the EU
		ASEAN, and the 10 countries of the ASEAN
Asset Name	The name of the funds contains at least one of the given words	ESG, SRI, Sustainable, Responsible, Ethical, Environmental, Social, Governance, Green, Islamic, Sharia, Christian.

Note: Expanded from *The price of ethics and stakeholder governance: The performance of socially responsible mutual funds*, by Rennebog et al., 2008.

4.2 Trend Analysis

We will conduct a trend analysis of the mutual fund for each geographic focus by examining the total AUM. We then repeated the process for the conventional funds, excluding the calculation of the fund's strategy. While conventional funds may have different strategies, this thesis will not look into the difference in their strategy. Comparing the SRI and conventional funds, AUM will provide insight into their significance for each regional market. However, since the information on the fund's AUM is not that accessible from Refinitiv, there will be an approximation of the fund's AUM by calculating the sum of its total net assets and total liabilities.

4.3 Performance Analysis

Similar to a company's share price, the value of a fund per share serves as a proxy for assessing its performance and riskiness. The NAV of the fund serves the same purposes. The calculation process started with calculating the monthly return with the logarithmic return for the simplicity it offers. With Excel, the calculation for the standard deviation from there is quite straightforward. While the result will be its monthly standard deviation, it is important to annualise the result to get a yearly standard deviation. We will calculate other risk metrics, such as beta, by comparing the funds to an index specific to the country or region. Europe will be using the EURO STOXX 600, while ASEAN—or Indonesia, Malaysia, and Thailand—will be using each of their composite indexes from their stock exchange. Following Renneboog et al. (2008), the risk-free rate used will be the 30-day Treasury bill in each respective country where the funds are registered (domiciled) or the regional interbank offered rate. Because the calculation emphasises locality and currency-less measures, there will be no need to use a common currency in the analysis process.

4.4 Collected Data

When you use the filter in We will retrieve the funds' data from Reuters. The screening process of the funds started by filtering the funds within the Reuters Funds universe. Renneboog et al. (2008) and Guimarães and Malaquias (2023) used the same approach of applying filters before acquiring the information related to the funds. **Table 4.1** displays the filters used in this thesis, after some adjustments. This filtering process will result in 209 mutual funds for the first geographic focus (Europe) and 84 mutual funds for the second geographical focus (ASEAN countries).

Applying the given restriction to the Reuters funds universe generates a report that provides the Lipper ID of the funds, their names, the currency used, and their approaches to portfolio composition. The Refinitiv Eikon feature inMs.Excel then retrieves each fund's monthly net asset value (the fund's value per share, abbreviated as NAV) and monthly assets under management (AUM). We obtain the information regarding conventional funds using the same steps and process, but with a slight change in the fund's characteristics. We set the asset name for conventional funds to exclude the SRI fund criteria, while the other criteria remain unchanged.

To retrieve information on the conventional funds, the criteria used are the same as shown in **Table 4.1**, except for two things: We do not use the assets in the screening process; instead,

we use the previously acquired list of ESG funds as an exclusion criterion to prevent their inclusion in the conventional fund screening. Not all funds were operational from 2016 to 2023 when we acquired the data, necessitating further data trimming. The trimming process resulted in 1969 funds for the first geographic focus and 662 for the second geographic focus.

Table 4.1 in Refinitiv's fund screener app, the information you get is split into four groups: ESG-SRI EU funds, SRI-ESG ASEAN funds, Non-SRI-ESG EU funds, and Non-SRI-ESG ASEAN funds. The data undergoes several cleaning steps before the calculation of performance and risk measures, leading to the removal of some funds. The criteria for the cleaning process include the fund's currency and the number of available NAVs, as some funds may not have any recorded NAVs.

Funds with a base currency of EUR (Euro) will be considered within the groups of Europe's geographical focus, while the list will exclude other currencies like USD. For the ASEAN geographical focus, the lack of a common currency makes the process less straightforward. While every country in ASEAN is being considered, there are only 5 countries with registered SRI-ESG funds: Indonesia, Malaysia, the Philippines, Thailand, and Vietnam. However, only Indonesia, Malaysia, and Thailand have a considerable number of funds listed in Refinitiv, whereas the remaining countries only have one or two funds. We apply this process to both the SRI-ESG and non-SRI-ESG fund lists. Table 4.2 displays the result.

We retrieved each fund's monthly NAV from December 2016 to December 2023, along with its ID, name, currency, and information on its investment strategy, which includes ESG, impact investing, negative screening, positive screening, religion, responsible investment, and SRI. Furthermore, the risk-free rate for each corresponding market will be the one-month Interbank Offered Rate (IBOR) for EUR (Euro), IDR (Indonesian Rupiah), MYR (Malaysian Ringgit), and THB (Thailand Baht). The Malaysian, Thailand, and Indonesian stock exchanges' KLSE, SET, and JKSE index will represent the market condition, while the Euro STOXX 600 index will represent the European market. The market value of the index and IBOR used in each region follow the same time period from December 2016 to December 2023.

Table 4.2 Number of funds after data cleaning as of 2023

Fund’s Category	Region/ Country focus	Number of Funds
ESG	Europe	206
	Indonesia	15
	Malaysia	53
	Thailand	10

Non-ESG	Europe	1969
	Indonesia	247
	Malaysia	146
	Thailand	269

5 Analysis of Results

5.1 ESG Trend

The performance analysis uses the same sample to calculate the value of mutual funds AUM (asset under management). The values were retrieved from Refinitiv. We then adjust the collected data to account for missing values between periods and for funds that lack available AUM data. Since all the funds in the sample are still active, we assume the missing value is a reporting issue rather than the funds being inactive. The availability of the fund's NAV and the filters applied in Refinitiv to display only active funds at the start of the data retrieval process used as the basis of this assumption. We will exclude funds without available AUM information from the calculation, and carryover funds with a missing value will use the value from the previous period.

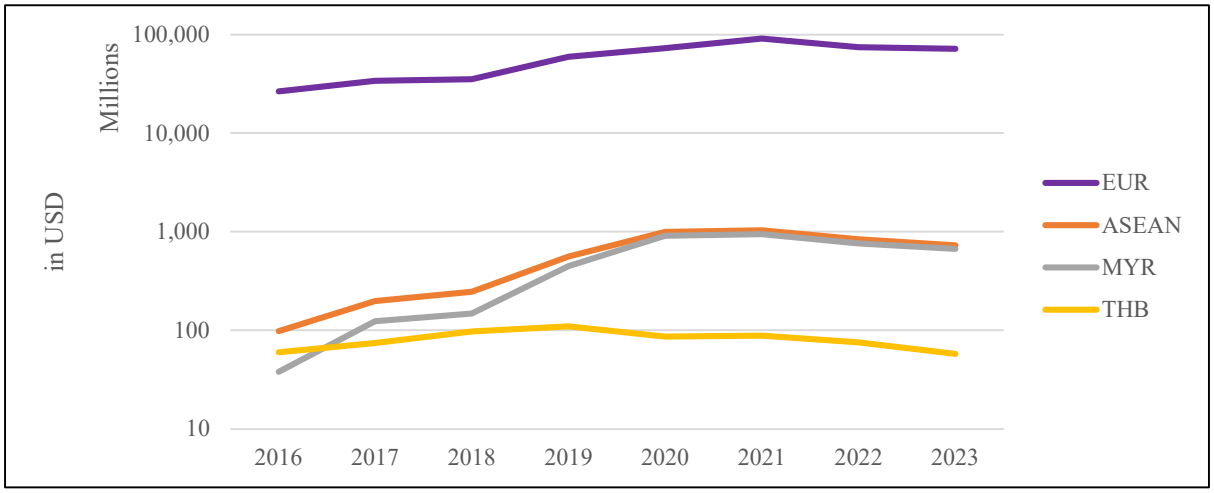

Figure 5.1 ESG Funds AUM Comparison

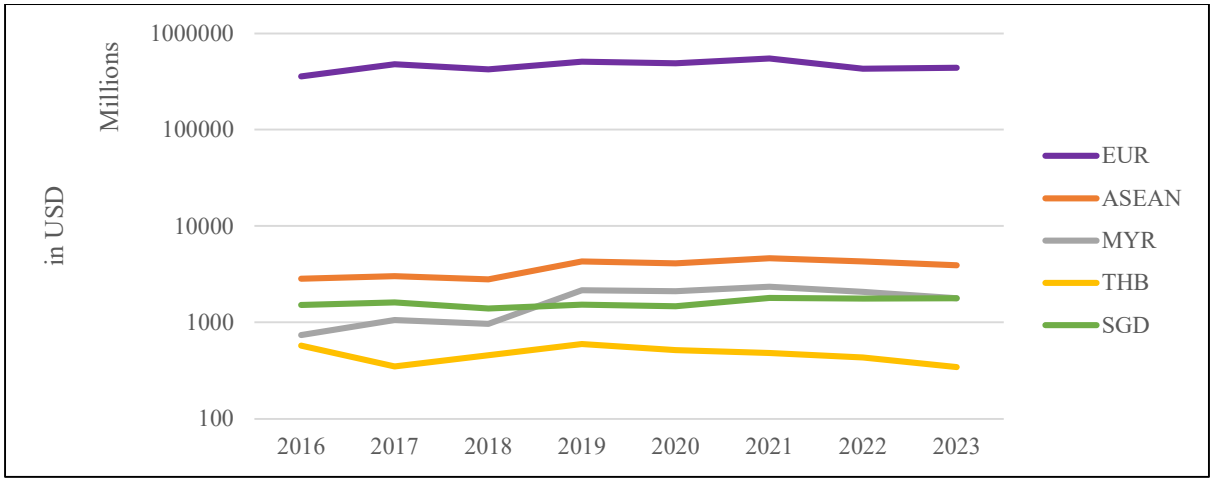

Figure 5.2 Conventional Funds AUM Comparison

We first retrieve each fund's AUM at the end of each year in their home currency, then focus on the respective region. We choose the USD as the common currency for cross-regional comparisons. We collect the exchange rates for each currency from Bloomberg at the end of each year, then compare the converted value, as illustrated in **Figure 5.1** and **Figure 5.2**. We calculate the value of ASEAN AUM by adding the dollar amount of each ASEAN country in the selected sample. We exclude Indonesia from the graphs in both figures for two distinct reasons:

(1) There is no available information regarding the AUM for the ESG funds.

(2) Only a few of the funds have their AUMs recorded in Refinitiv, resulting in a low total value for the region, making it appear far below other regions.

Table 5.1 Funds AUM Growth from 2016 to 2023

Region	Conventional Funds	ESG Funds
Europe	20.4%	99.0%
ASEAN	32.2%	200.1%

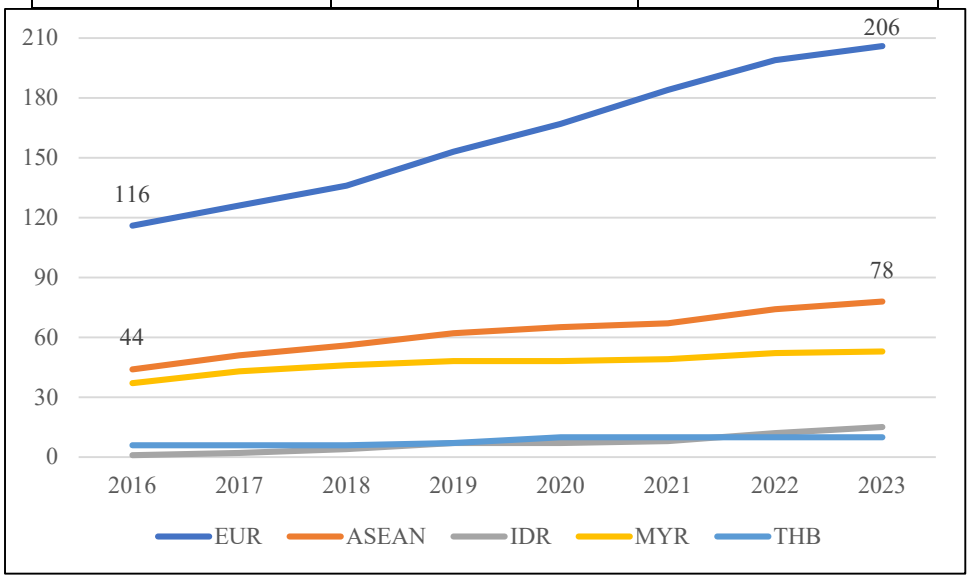

Figure 5.3 Number of ESG Funds from 2016 until 2023

Due to the limitations of the collected information, it is not possible to view the displayed value as the actual value of either ESG or conventional mutual funds in the region, as the sample may not include all ESG and conventional funds in the region. However, it may display trends in the value of both ESG and conventional funds in the region. **Table 5.1** summarises AUM's growth from December 2016 to December 2023, which shows significant growth of ESG or sustainable-related mutual funds in both regions. In terms of the amount of funds, the number of funds in each region also shows a general positive trend from 2016 until 2023, as

illustrated in **Figure 5.3** and **Figure 5.4**. We acquired the number of ASEAN funds in both figures by adding the number of fund samples focused on Indonesia, Thailand, and Malaysia.

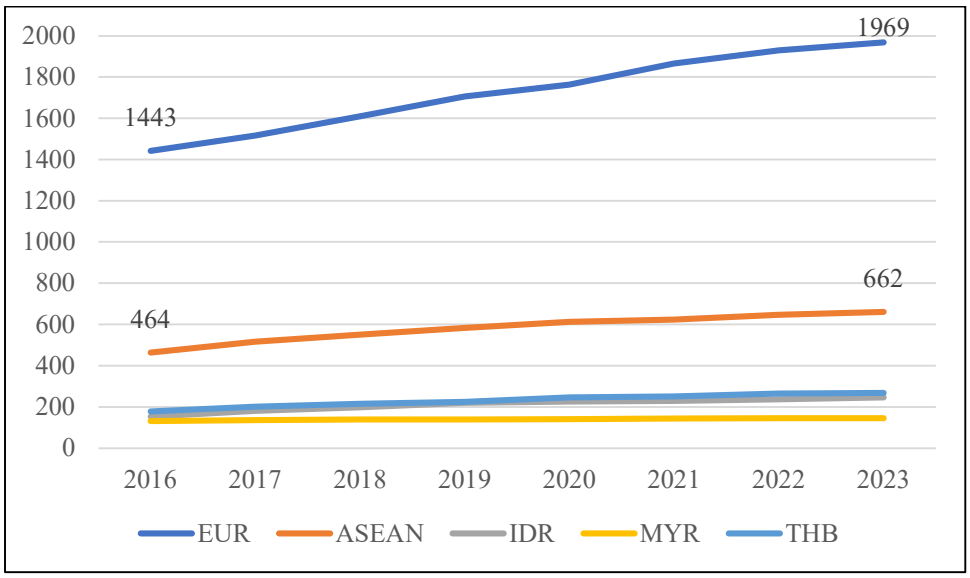

Figure 5.4 Number of Conventional Funds from 2016 until 2023

5.2 Fund's Performance

The calculation of the fund's return is the most straightforward method of performance measures. We choose the logarithmic method due to its simple formula and ease of calculation for multiple periods. We calculate each fund's yearly return by adding each of its monthly returns within the same year. We then average the return to obtain the yearly average return, as presented in **Table 5.2**. The results reflect both the outperformance and underperformance of ESG funds. Note that we do not use any data trimming except for the initial process to avoid calculation errors, as the calculated value is an accurate representation of the fund's performance. While data trimming may enhance the potential for a more comprehensive overview, it also carries the risk of biasing the results and failing to accurately reflect the actual state of the mutual funds market in the targeted region[1]. With an additional t-test, assuming unequal variance between ESG funds and conventional funds, it is evident that based on the collected sample, most of the results were not statistically significant. In some years, however, there has been both significant outperformance and underperformance of ESG funds. Some of the periods with statistically significant outperformance are in Europe (2017 and 2018), Indonesia (2017, 2018, 2019, 2020, 2023, and 2017-2023), and Malaysia (2019). In addition,

[1] Appendix A (sustainable funds) and Appendix B (non-sustainable funds) provide the descriptive statistics for the funds' annualised return, annualised monthly standard deviation, Sharpe ratio, and Treynor ratio.

a few statistically significant underperformances of ESG funds are evident in Indonesia (2021) and Thailand (2019).

Table 5.2 Average yearly return

Region	Market data		Period	ESG funds	Conventional funds (Benchmark)
	Risk-free rate	Market index			
Europe	EUR001M Index	SXXP Index	2023	16.82%	11.13%
			2022	-7.79%	-17.45%
			2021	24.66%	17.79%
			2020	11.65%	0.47%
			2019	28.48%	17.96%
			2018	-8.27% ***	-16.73%
			2017	15.07% ***	11.85%
			2017-2023	45.93%	22.32%
Indonesia	JIIN1M Index	JCI Index	2023	4.25% ***	-3.66%
			2022	3.48%	-0.55%
			2021	-3.22% *	0.51%
			2020	-7.84% **	-8.04%
			2019	2.60% ***	-16.69%
			2018	-1.53% ***	-3.37%
			2017	4.23% ***	11.02%
			2017-2023	3.02% ***	-20.58%
Malaysia	KLIB1M Index	KLSE Index	2023	3.53%	3.12%
			2022	-13.96%	-12.09%
			2021	0.54%	1.66%
			2020	14.76%	12.41%
			2019	8.05% **	4.98%
			2018	-19.38%	-17.97%
			2017	9.80%	8.88%
			2017-2023	2.13%	0.60%
Thailand	BTHA1M2M Index	SETI Index	2023	-12.84%	-10.93%
			2022	-0.97%	-3.05%
			2021	13.75%	15.34%
			2020	-4.03%	-8.16%
			2019	-2.78% ***	2.67%
			2018	-12.95%	-13.70%
			2017	8.49%	12.38%
			2017-2023	-8.71%	-6.56%

Note: Statistical Significance (presented next to the calculated number) at 10% *; 5% **; 1% ***.

Table 5.3 Average annualized monthly standard deviation

Region	Market data		Period	ESG funds	Conventional funds (Benchmark)
	Risk-free rate	Market index			
Europe	EUR001M Index	SXXP Index	2023	14.02%	14.51%
			2022	20.20%	20.23%
			2021	10.77% **	11.42%
			2020	26.37% ***	29.11%
			2019	10.37% ***	13.12%
			2018	12.26% ***	13.10%
			2017	8.02% ***	8.34%
			2017-2023	16.37% ***	18.20%
Indonesia	JIIN1M Index	JCI Index	2023	9.22%	9.78%
			2022	13.81%	12.93%
			2021	12.86% ***	13.93%
			2020	31.97% ***	32.08%
			2019	12.63% ***	18.07%
			2018	10.68% ***	15.12%
			2017	7.20% ***	12.81%
			2017-2023	13.83% ***	18.48%
Malaysia	KLIB1M Index	KLSE Index	2023	7.09% ***	8.46%
			2022	14.07%	13.44%
			2021	12.63%	11.91%
			2020	25.79%	26.52%
			2019	7.52% **	8.37%
			2018	11.95%	11.89%
			2017	6.56% ***	8.49%
			2017-2023	13.80%	14.34%
Thailand	BTHA1M2M Index	SETI Index	2023	10.48% *	11.56%
			2022	10.81%	10.77%
			2021	12.81%	13.85%
			2020	28.17%	30.82%
			2019	8.69%	9.68%
			2018	13.00%	13.30%
			2017	8.32%	8.51%
			2017-2023	15.10%	16.16%

Note: Statistical Significance (presented next to the calculated number) at 10% *; 5% **; 1% ***.

Outside of the mentioned period, the mean return—based on the collected sample—is not statistically significant at every chosen alpha level. To further enrich the performance comparison of the funds, it is important to include the riskiness of each category and compare the risk-adjusted return of the funds.

By following the steps in Section 4.3 and calculating the extra variables (covariance and beta) needed to get the ratios you want, you can then figure out and compare the fund's NAV standard deviation, the Sharpe ratio, and the Treynor ratio. **Table 5.3**, **Table 5.4**, and **Table 5.5** respectively display the annualised monthly standard deviation, yearly Sharpe ratio, and yearly Treynor ratio. A simple observation shows that there are mixed results and inconsistencies on whether ESG funds are outperforming or underperforming conventional funds in all three metrics. Out of the four regions in consideration, it appears that only Indonesia shows a statistically significant difference in the mean value across different years in all three measures. Europe only shows a statistically significant difference for the mean value of the fund's standard deviation, while the other metrics are only significant in one or two periods. Another region, Thailand and Malaysia, also showed similar results to Europe, with only a few significant differences in all three metrics.

We first calculate each fund's monthly standard deviation using the logarithmic monthly return to get the yearly standard deviation. The results are then annualised to get the yearly standard deviation of each fund. We calculate the average annualised monthly standard deviation in **Table 5.3** by averaging the annualised results of each fund in each category. The results show that ESG funds have a statistically significant lower standard deviation than their conventional counterparts in each region. The results are consistent across Europe (2017, 2018, 2019, 2020, 2021, and 2023), Indonesia (2017, 2018, 2019, 2020, 2021, and 2017-2023), Malaysia (2017 and 2019), and Thailand (2023). While there are some years when the sample collected implies that ESG funds have higher total risk than conventional funds, the results are not statistically significant at any chosen alpha.

The calculation of the funds' standard deviation allows the calculation of its risk-adjusted performance, the Sharpe ratio. We obtained the average yearly Sharpe ratio, as shown in **Table 5.4**, by calculating the yearly Sharpe ratio of each fund and averaging the result per year. Combining the analysis with the t-test suggests ESG funds' underperformance and outperformance are statistically significant in different regions and periods. In Europe, ESG funds outperform conventional funds in 2023 and between 2017 and 2023. However, in 2017, the results imply that conventional funds outperform ESG funds. The results mentioned are all statistically significant. Indonesia shows a similar result, with statistically significant

outperformance during 2018, 2019, 2020, 2022, and 2023, and underperformance during 2017. Malaysia and

Table 5.4 Average yearly Sharpe ratio

Region	Market data		Period	ESG funds	Conventional funds (Benchmark)
	Risk-free rate	Market index			
Europe	EUR001M Index	SXXP Index	2023	0.646 *	0.489
			2022	-0.846	-0.851
			2021	1.846	1.821
			2020	0.079	0.065
			2019	2.203	1.842
			2018	-1.165	-1.116
			2017	1.326 ***	1.634
			2017-2023	1.482 *	1.325
Indonesia	JIIN1M Index	JCI Index	2023	-0.244 ***	-1.062
			2022	-0.116 **	-0.517
			2021	-0.694	-0.333
			2020	-0.389 ***	-0.417
			2019	-0.310 ***	-0.925
			2018	-0.787 *	-1.264
			2017	-0.782 ***	0.552
			2017-2023	-3.324	-3.356
Malaysia	KLIB1M Index	KLSE Index	2023	-0.098	-0.030
			2022	-1.120	-1.068
			2021	-0.062	-0.026
			2020	0.405	0.347
			2019	0.453 **	0.147
			2018	-1.920	-1.830
			2017	1.012	0.898
			2017-2023	-2.589	-1.618
Thailand	BTHA1M2M Index	SETI Index	2023	-1.441	-1.312
			2022	-0.138	-0.235
			2021	1.078	1.098
			2020	-0.131	-0.297
			2019	-0.522 **	0.067
			2018	-1.132	-1.257
			2017	1.044	1.513
			2017-2023	-1.232	-1.060

Note: Statistical Significance (presented next to the calculated number) at 10% *; 5% **; 1% ***.

Table 5.5 Average yearly Treynor ratio

Region	Market data		Period	ESG funds	Conventional funds (Benchmark)
	Risk-free rate	Market index			
Europe	EUR001M Index	SXXP Index	2023	0.888	-0.472
			2022	-0.226	-0.226
			2021	0.238	0.962
			2020	0.007	1.249
			2019	-0.050	-4.064
			2018	-0.111 *	-0.278
			2017	0.085	0.096
			2017-2023	0.266	-3.451
Indonesia	JIIN1M Index	JCI Index	2023	-0.039	-0.028
			2022	-0.008 ***	0.268
			2021	-0.138 **	0.448
			2020	-0.147 ***	0.454
			2019	-0.048	-1.044
			2018	-0.097 ***	0.574
			2017	-0.077 **	1.432
			2017-2023	-0.654	-1.510
Malaysia	KLIB1M Index	KLSE Index	2023	0.080	0.817
			2022	-0.199	-0.235
			2021	-1.016	-0.062
			2020	0.274	0.231
			2019	0.317 *	0.078
			2018	-0.596	-1.212
			2017	0.171	-0.165
			2017-2023	-0.287	-0.430
Thailand	BTHA1M2M Index	SETI Index	2023	-0.155	-0.147
			2022	-0.032 **	-0.219
			2021	0.146	0.197
			2020	-0.046	-0.084
			2019	0.936	0.026
			2018	-0.139 **	-0.199
			2017	0.093 *	0.437
			2017-2023	-0.189	-0.231

Note: Statistical Significance (presented next to the calculated number) at 10% *; 5% **; 1% ***.

Thailand only have one period where the results are significant. Malaysia's ESG outperformed in 2019, and Thailand's ESG underperformed in 2019.

The Treynor ratio serves as another risk-adjusted performance calculation. As mentioned in Section 3.2, the use of different risk-adjusted measures is intended to overcome the unknown nature of mutual funds in terms of whether or not they are a fully diversified portfolio. The Sharpe ratio assumes that the funds are not fully diversified, whereas the Treynor ratio assumes that they are fully diversified. The calculation process yields the result in **Table 5.5**, which is a similar risk-reward ratio as the Sharpe ratio but with a different risk measure as the denominator: beta. The results, not far off from other calculations, indicate that ESG funds' Treynor ratio has fluctuated over the years and is not showing either consistent outperformance or underperformance compared to its counterpart.

After combining the results with the t-test, the result still indicates inconsistent performance between ESG and conventional funds. In 2018, only Europe showed a sign of statistical significance, indicating that ESG funds outperform conventional funds. Malaysia also achieved the same outcome in 2019. In Indonesia, calculation results show a different outcome. While most of the calculation results are significant, all of them indicate that ESG funds have lower risk-adjusted performance compared to non-ESG funds in 2017, 2018, 2020, 2021, and 2022. On the other hand, Thailand ESG funds showed significant outperformance in 2018 and 2022 and underperformance in 2022.

5.3 Discussion

The trend analysis reveals a positive trend, signifying a rise in the value of assets under mutual fund management, aligning with the criteria outlined in We will retrieve the funds' data from Reuters. The screening process of the funds started by filtering the funds within the Reuters Funds universe. Renneboog et al. (2008) and Guimarães and Malaquias (2023) used the same approach of applying filters before acquiring the information related to the funds. **Table 4.1** displays the filters used in this thesis, after some adjustments. This filtering process will result in 209 mutual funds for the first geographic focus (Europe) and 84 mutual funds for the second geographical focus (ASEAN countries).

Applying the given restriction to the Reuters funds universe generates a report that provides the Lipper ID of the funds, their names, the currency used, and their approaches to portfolio composition. The Refinitiv Eikon feature inMs.Excel then retrieves each fund's monthly net asset value (the fund's value per share, abbreviated as NAV) and monthly assets

under management (AUM). We obtain the information regarding conventional funds using the same steps and process, but with a slight change in the fund's characteristics. We set the asset name for conventional funds to exclude the SRI fund criteria, while the other criteria remain unchanged.

To retrieve information on the conventional funds, the criteria used are the same as shown in **Table 4.1**, except for two things: We do not use the assets in the screening process; instead, we use the previously acquired list of ESG funds as an exclusion criterion to prevent their inclusion in the conventional fund screening. Not all funds were operational from 2016 to 2023 when we acquired the data, necessitating further data trimming. The trimming process resulted in 1969 funds for the first geographic focus and 662 for the second geographic focus.

Table 4.1. Both ESG fund AUM and the number of ESG funds within the region are increasing from year to year. COVID-19's financial crisis in 2020 is not impeding the growth of funds in both categories. Given its status as one of the developed markets for sustainable investment, we can anticipate and recognize the rise in AUM in Europe. ASEAN countries, on the other hand, may not receive enough spotlight in the market for sustainable investment. The illustration in **Figure 5.1** indicates that the developing regions—in this case, ASEAN countries—have started to move towards a sustainable investment regime.

The calculation in **Table 5.1** supports a visual uptrend in the number of assets managed by ESG funds, but the funds' value peaked in 2020 and 2021 and then decreased in the following years (2022 and 2023). Many factors, including capital outflow and negative market performance, can contribute to this value decrease.

It is outside the scope of this research to identify what causes the decrease in value; however, the market index within the region of interest does indicate a negative performance in 2022. The Euro STOXX 600 index has a negative performance (-13.8%) by the end of the year, and the Malaysian KLSE index has a negative performance for three consecutive years from 2021 to 2023 (-3.7%, -4.7%, and -2.7%). Malaysia is not the only country in the sample for ESG funds in the ASEAN region; Indonesia and Thailand are also included. Nonetheless, with the majority of the sample originating from Malaysia, the total value of the ASEAN ESG fund's AUM closely tracks the movement of Malaysian funds, heavily influenced by the Malaysian market. **Figure 5.1** shows that the line representing the ASEAN ESG fund and the Malaysian ESG fund closely aligns from 2020 onwards. The Thailand market index—SETI—also experienced a negative performance in 2023 (-16.4%), which may be one of the events that caused the drop in total AUM of ESG funds in the region.

However, based on the collected sample within the observed period, the total AUM of conventional funds is pretty much stagnant. Except for the ASEAN constituents, there are no significant ups and downs.

In addition, the funds' performance is showing mixed results. Europe, as one of the developed markets for sustainable and responsible themed investments, does not show a significant difference between ESG and conventional funds. The only exception is the mean standard deviation of the funds. Indonesia, however, showed a statistically significant mixed result across all measures. The other two countries, Thailand and Malaysia, have only shown a significant result in some years across the metrics used.

This result may not be consistent with other research in which a sustainable-themed portfolio either outperforms or underperforms the conventional portfolio. At the least, based on the sample acquired with the described criteria of sampling and within the chosen time period, that is the case. This thesis aligns with the findings of Renneboog et al. (2008), which found no statistically significant difference in performance between ESG and conventional funds. The outcome from Prol and Kim (2022) is also comparable to this thesis, where there is no clear supporting evidence that ESG can be beneficial for portfolio risk and return.

The result of this thesis also implies that both a developed market for sustainable investment—such as Europe—and a developing market—such as ASEAN—have a similar outcome in terms of how significant the difference between sustainable themed and conventional funds is according to their respective markets. Hence, there is no reason to choose conventional funds over ESG or sustainable-themed funds. With no significant difference in risk-adjusted returns between the two, sustainable assets or investments offer a higher utility for society as a whole, assuming high ESG or SRI-rated equity is providing actual benefits for the environment and society. This should motivate stakeholders, such as governments that have political and legal power, to promote the growth of sustainable investment, especially sustainable funds. Combined with the social movement and economic preference of the public, sustainable investment and sustainable funds should be able to dominate the investment market. Though it is tempting to use that as a conclusion, the discussion on the sample size at the beginning is critical to determining how reliable and comparable the calculation of the funds' performance is. We must take into account the following limitations:

(1) In Europe, the ratio between the number of samples for ESG funds and conventional funds is between 1:9.5 and 1:12.4. While more samples may help acquire a more representative result, the different size between the two may reduce the power of the test statistic used in this thesis,

(2) Thailand and Indonesia, both with a limited number of observations, may yield ambiguous results regarding their statistical significance, and
(3) Malaysia is likely to have the most balanced number of observations for both ESG and conventional funds.

These limitations could potentially lead to unreliable results, a topic for future research to explore.

6 Conclusion

According to the Analysis of Results in Chapter 5, the answers to the two research questions posed at the beginning of this thesis appear to be clear. The trend is showing positive growth in both Europe and ASEAN, with the difference in growth rate between conventional and sustainable-themed funds being significant. In the ASEAN market, the funds' growth rate across the span of 7 years is even higher compared to the European market. Although the actual value of active mutual funds may differ from the results shown, the general trends may not differ too much from the actual condition. Furthermore, the number of funds increased in tandem with the growth in total AUM within each region, offering investors a wider range of alternative investment options.

However, the retrieved sample yielded mixed results regarding the differences in risk level and risk-adjusted return between ESG-themed funds and conventional funds. European ESG funds have a significantly lower standard deviation compared to their conventional counterparts. On the other hand, Indonesia's results are mixed, even though they are statistically significant, indicating no clear outperformance or underperformance. Additionally, both Malaysia and Thailand have mixed results, only showing signs of statistical significance in some periods. Thus, it is safe to say there are mixed results between the region and time period, and there is no clear generalised statement for the ESG fund's performance across different regions and time periods based on the collected samples.

Several limitations encountered during the process may also influence the outcome. Some of these are:

(1) While I rely on Reuters as my primary and exclusive source of fund data, it is clear that they may not possess all the necessary information. For instance, they do not possess information on the AUM of Indonesian funds.

(2) The limited number of available observations may not accurately reflect the actual conditions within some region and time period.

(3) The calculation uses a localised and time-sensitive value, such as the 1-month-offered rate and the market index; this makes it difficult to generalise the result across time and region when the values used are not a single global or general value.

(4) This thesis does not study other potential influences on the outcome, such as external macroeconomic attributes or intrinsic fund attributes.

I encourage further research using available market assets that retail investors or the general public can buy. It can be mutual funds, ETFs, or other kinds of ready-to-purchase portfolios that may become available in the future. The public has the right to know whether they will benefit from the investment options they find attractive and accessible in the market, as well as from the simplest form of risk management: portfolio diversification.

~RS~

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Appendix A Sustainable Funds Descriptive Statistics

Europe

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	206	-39.59%	5.80%	9.10%	12.74%	15.00%	16.82%	32.28%	11.70%
2022	199	-46.16%	-26.93%	-21.91%	-16.21%	-12.29%	-7.79%	6.73%	-17.14%
2021	184	-1.67%	12.42%	16.55%	19.81%	22.40%	24.66%	-34.76%	18.87%
2020	167	-21.88%	-9.98%	-4.63%	-0.32%	6.61%	11.65%	34.78%	0.77%
2019	153	-2.98%	13.62%	18.22%	21.99%	24.97%	28.48%	34.08%	21.24%
2018	136	-40.88%	-21.70%	-16.67%	-13.98%	-10.05%	-8.27%	-2.15%	-14.40%
2017	126	-2.02%	4.68%	8.10%	9.66%	11.69%	15.07%	25.22%	10.00%
2017-2023		-50.65%	1.77%	13.70%	27.53%	37.94%	45.93%	90.65%	25.01%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	206	1.68%	10.51%	11.64%	13.36%	15.19%	18.04%	66.62%	14.02%
2022	199	2.55%	16.43%	18.30%	19.89%	21.75%	24.95%	31.42%	20.20%
2021	184	1.68%	9.03%	9.86%	10.69%	11.46%	12.61%	27.49%	10.77%
2020	167	2.45%	19.34%	23.23%	26.23%	29.31%	34.23%	47.38%	26.37%
2019	153	0.90%	6.82%	9.42%	10.59%	11.73%	13.34%	15.66%	10.37%
2018	136	3.75%	9.77%	10.78%	11.88%	13.29%	14.78%	27.08%	12.26%
2017	126	4.11%	6.57%	7.26%	7.76%	8.63%	9.48%	16.97%	8.02%
2017-2023		2.23%	13.27%	14.82%	16.19%	17.74%	19.71%	33.66%	16.37%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	206	-0.646	0.169	0.452	0.720	0.901	1.008	1.434	0.646
2022	199	-1.821	-1.234	-1.045	-0.862	-0.666	-0.425	0.333	-0.846
2021	184	-0.254	1.198	1.575	1.929	2.222	2.469	2.958	1.846
2020	167	-1.893	-0.345	-0.141	0.007	0.301	0.578	1.596	0.079
2019	153	-0.229	1.378	1.770	2.232	2.587	3.021	5.082	2.203
2018	136	-3.345	-1.674	-1.326	-1.153	-0.905	-0.667	-0.132	-1.165
2017	126	-0.227	0.757	1.046	1.306	1.504	1.932	3.392	1.326
2017-2023		-2.034	0.031	0.697	1.618	2.351	2.786	3.891	1.482

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	206	-0.371	0.030	0.068	0.105	0.135	0.171	159.764	0.888
2022	199	-2.845	-0.411	-0.255	-0.176	-0.131	-0.087	0.096	-0.226
2021	184	-0.008	0.138	0.199	0.233	0.276	0.334	0.704	0.238
2020	167	-0.411	-0.109	-0.043	0.002	0.073	0.118	0.496	0.007
2019	153	-49.680	0.125	0.190	0.233	0.292	0.357	2.974	-0.050
2018	136	-0.860	-0.294	-0.218	-0.158	-0.118	-0.078	6.000	-0.111
2017	126	-5.142	0.067	0.094	0.121	0.161	0.227	1.026	0.085
2017-2023		-2.751	0.006	0.142	0.280	0.407	0.533	1.945	0.266

Indonesia

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	15	-4.25%	-1.62%	2.08%	6.39%	7.46%	8.04%	9.49%	4.25%
2022	12	-10.94%	-4.62%	-2.85%	2.97%	12.49%	13.97%	14.40%	3.48%
2021	8	-10.87%	-7.08%	-4.76%	-3.17%	-1.20%	0.47%	3.56%	-3.22%
2020	7	-10.11%	-8.97%	-8.04%	-7.64%	-7.45%	-6.83%	-6.16%	-7.84%
2019	7	-0.38%	-0.14%	1.13%	2.97%	4.00%	4.64%	5.34%	2.60%
2018	4	-5.56%	-5.43%	-5.23%	-2.54%	1.15%	3.18%	4.53%	-1.53%
2017	2	0.13%	0.95%	2.18%	4.23%	6.28%	7.51%	8.33%	4.23%
2017-2023		-24.56%	-8.59%	-2.29%	2.16%	11.97%	16.70%	20.39%	3.02%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	15	6.26%	8.18%	8.9%	9.1%	9.9%	10.70%	11.15%	9.22%
2022	12	8.13%	10.66%	13.0%	14.7%	15.3%	16.27%	16.74%	13.81%
2021	8	3.36%	7.30%	10.8%	15.5%	15.9%	16.21%	16.25%	12.86%
2020	7	29.51%	30.91%	31.9%	32.0%	32.1%	32.94%	34.17%	31.97%
2019	7	11.22%	11.44%	11.8%	12.1%	12.9%	14.50%	15.78%	12.63%
2018	4	10.03%	10.11%	10.2%	10.5%	11.0%	11.35%	11.57%	10.68%
2017	2	7.20%	7.20%	7.2%	7.2%	7.2%	7.20%	7.20%	7.20%
2017-2023		9.52%	10.26%	10.4%	12.2%	17.6%	18.36%	18.62%	13.83%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	15	-1.223	-0.761	-0.546	-0.025	0.091	0.178	0.316	-0.244
2022	12	-1.463	-0.680	-0.482	-0.137	0.529	0.641	0.659	-0.116
2021	8	-2.194	-1.552	-0.752	-0.443	-0.312	-0.206	-0.008	-0.694
2020	7	-0.496	-0.439	-0.394	-0.379	-0.374	-0.346	-0.313	-0.389
2019	7	-0.613	-0.530	-0.389	-0.270	-0.207	-0.155	-0.096	-0.310
2018	4	-1.156	-1.126	-1.081	-1.007	-0.603	-0.361	-0.199	-0.787
2017	2	-0.782	-0.782	-0.782	-0.782	-0.782	-0.782	-0.782	-0.782
2017-2023		-6.008	-4.805	-4.283	-3.663	-1.786	-1.600	-1.397	-3.324

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	15	-0.155	-0.127	-0.093	-0.007	0.011	0.022	0.047	-0.039
2022	12	-0.212	-0.153	-0.137	-0.032	0.162	0.188	0.200	-0.008
2021	8	-0.237	-0.224	-0.193	-0.145	-0.101	-0.045	-0.001	-0.138
2020	7	-0.161	-0.155	-0.150	-0.146	-0.144	-0.139	-0.134	-0.147
2019	7	-0.095	-0.079	-0.058	-0.043	-0.032	-0.024	-0.015	-0.048
2018	4	-0.137	-0.136	-0.133	-0.129	-0.077	-0.046	-0.025	-0.097
2017	2	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077
2017-2023		-1.158	-0.969	-0.794	-0.669	-0.452	-0.391	-0.345	-0.654

Malaysia

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	53	-4.8%	-0.31%	1.1%	3.5%	5.9%	8.57%	13.5%	3.5%
2022	52	-33.5%	-27.04%	-19.4%	-13.1%	-9.2%	-2.65%	3.7%	-14.0%
2021	49	-51.4%	-6.08%	-3.4%	0.6%	4.5%	9.45%	35.6%	0.5%
2020	48	-14.8%	-5.60%	6.5%	14.9%	23.5%	33.31%	40.6%	14.8%
2019	48	-1.5%	1.15%	2.7%	6.6%	12.3%	17.49%	29.1%	8.1%
2018	46	-40.8%	-31.40%	-26.1%	-17.4%	-12.9%	-9.47%	-2.1%	-19.4%
2017	43	-9.8%	-0.06%	6.2%	8.7%	15.2%	19.41%	28.4%	9.8%
2017-2023		-35.7%	-18.26%	-7.5%	1.2%	13.4%	23.95%	44.6%	2.1%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	53	0.36%	4.56%	5.26%	6.65%	8.41%	10.36%	15.19%	7.09%
2022	52	8.63%	10.46%	12.02%	13.27%	15.38%	18.85%	24.54%	14.07%
2021	49	6.53%	7.20%	8.61%	9.63%	13.91%	18.06%	63.59%	12.63%
2020	48	2.11%	17.75%	19.68%	25.71%	31.16%	36.97%	41.53%	25.79%
2019	48	2.01%	4.98%	5.38%	7.89%	8.93%	10.61%	13.78%	7.52%
2018	46	3.22%	8.58%	9.41%	11.55%	14.47%	16.49%	20.53%	11.95%
2017	43	1.11%	4.16%	4.75%	5.90%	8.12%	10.50%	12.88%	6.56%
2017-2023		0.36%	9.93%	10.93%	12.97%	15.98%	19.50%	29.29%	13.80%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	53	-5.303	-0.764	-0.337	0.028	0.397	0.695	1.072	-0.098
2022	52	-2.206	-1.784	-1.525	-1.082	-0.769	-0.376	0.123	-1.120
2021	49	-1.884	-0.749	-0.491	-0.058	0.257	0.694	2.454	-0.062
2020	48	-2.473	-0.371	0.151	0.559	0.805	0.944	1.330	0.405
2019	48	-2.149	-0.399	-0.086	0.467	0.988	1.611	2.516	0.453
2018	46	-3.419	-2.641	-2.245	-1.793	-1.490	-1.258	-0.976	-1.920
2017	43	-2.994	-0.667	0.430	1.057	1.828	2.309	3.238	1.012
2017-2023		-56.101	-3.316	-2.286	-1.614	-0.654	0.155	1.154	-2.589

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	53	-0.185	-0.062	-0.021	0.011	0.059	0.200	1.022	0.080
2022	52	-0.838	-0.632	-0.288	-0.172	-0.090	-0.041	1.977	-0.199
2021	49	-33.416	-1.892	-0.223	-0.044	0.003	0.085	0.580	-1.016
2020	48	-0.363	-0.113	0.048	0.201	0.418	0.746	1.169	0.274
2019	48	-0.118	-0.039	-0.007	0.069	0.404	1.007	2.523	0.317
2018	46	-3.035	-1.380	-0.627	-0.329	-0.180	-0.114	-0.038	-0.596
2017	43	-0.665	-0.034	0.032	0.105	0.279	0.613	0.790	0.171
2017-2023		-4.292	-0.922	-0.419	-0.262	-0.122	0.266	4.164	-0.287

Thailand

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	10	-17.6%	-16.81%	-15.5%	-13.7%	-9.1%	-8.43%	-7.9%	-12.8%
2022	10	-6.8%	-5.24%	-4.7%	-1.2%	3.3%	4.62%	4.7%	-1.0%
2021	10	8.1%	9.02%	9.9%	14.6%	15.5%	16.74%	23.1%	13.8%
2020	10	-16.9%	-12.57%	-10.2%	-6.8%	1.1%	6.05%	16.2%	-4.0%
2019	7	-8.7%	-6.61%	-5.1%	-2.9%	-0.4%	1.21%	3.0%	-2.8%
2018	6	-17.6%	-15.90%	-13.7%	-11.8%	-11.3%	-11.16%	-11.0%	-12.9%
2017	6	-0.2%	1.17%	2.5%	5.0%	14.7%	19.27%	21.4%	8.5%
2017-2023		-39.9%	-30.28%	-24.0%	-2.4%	4.9%	9.36%	10.8%	-8.7%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	10	7.64%	9.07%	9.57%	10.63%	11.44%	11.98%	12.78%	10.48%
2022	10	7.95%	8.33%	9.04%	10.58%	11.20%	14.16%	16.01%	10.81%
2021	10	10.29%	10.81%	11.12%	11.80%	13.50%	14.57%	20.77%	12.81%
2020	10	16.03%	19.53%	26.10%	28.85%	31.60%	33.51%	39.37%	28.17%
2019	7	4.81%	6.29%	7.64%	8.64%	10.29%	11.15%	11.49%	8.69%
2018	6	9.64%	10.69%	12.11%	13.70%	14.26%	14.60%	14.91%	13.00%
2017	6	5.55%	6.57%	7.64%	7.85%	9.16%	10.52%	11.46%	8.32%
2017-2023		12.27%	12.97%	13.75%	14.85%	15.49%	18.00%	19.34%	15.10%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	10	-1.980	-1.778	-1.674	-1.409	-1.218	-1.052	-1.031	-1.441
2022	10	-0.722	-0.547	-0.380	-0.248	0.257	0.388	0.443	-0.138
2021	10	0.638	0.647	0.688	0.959	1.339	1.496	2.072	1.078
2020	10	-0.538	-0.450	-0.392	-0.221	0.002	0.209	0.774	-0.131
2019	7	-0.955	-0.925	-0.839	-0.576	-0.288	-0.083	0.130	-0.522
2018	6	-1.424	-1.355	-1.241	-1.102	-0.991	-0.937	-0.919	-1.132
2017	6	-0.230	-0.070	0.092	0.429	1.667	2.774	3.576	1.044
2017-2023		-3.278	-3.015	-2.215	-0.741	-0.377	-0.030	0.070	-1.232

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	10	-0.217	-0.211	-0.199	-0.159	-0.114	-0.094	-0.085	-0.155
2022	10	-0.130	-0.104	-0.083	-0.021	0.021	0.043	0.049	-0.032
2021	10	0.071	0.086	0.099	0.136	0.166	0.246	0.256	0.146
2020	10	-0.179	-0.142	-0.108	-0.063	0.004	0.059	0.133	-0.046
2019	7	-0.171	-0.112	-0.068	-0.037	-0.007	2.771	6.910	0.936
2018	6	-0.208	-0.186	-0.156	-0.128	-0.112	-0.104	-0.100	-0.139
2017	6	-0.025	0.000	0.026	0.063	0.172	0.216	0.235	0.093
2017-2023		-0.496	-0.386	-0.347	-0.122	-0.048	-0.004	0.012	-0.189

Appendix B Non-Sustainable Funds Descriptive Statistics

Europe

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	1969	-217.31%	2.33%	7.94%	12.13%	15.35%	18.18%	158.16%	11.13%
2022	1930	-254.80%	-31.55%	-23.20%	-15.59%	-10.22%	-4.80%	36.67%	-17.45%
2021	1866	-443.23%	9.13%	14.74%	19.16%	22.42%	25.65%	690.76%	17.79%
2020	1764	-453.22%	-11.58%	-6.20%	-0.69%	6.76%	15.18%	95.49%	0.47%
2019	1706	-901.30%	9.87%	16.34%	20.83%	23.75%	27.11%	42.02%	17.96%
2018	1609	-84.05%	-26.28%	-20.61%	-15.82%	-12.23%	-8.49%	102.12%	-16.73%
2017	1516	-58.74%	4.68%	8.00%	10.97%	15.65%	20.67%	42.22%	11.85%
2017-2023		-889.46%	-0.93%	11.43%	25.87%	38.26%	47.17%	691.72%	22.32%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	1969	0.02%	10.01%	11.85%	13.96%	16.27%	18.86%	230.84%	14.51%
2022	1930	0.25%	15.33%	17.94%	20.09%	22.13%	25.34%	235.99%	20.23%
2021	1866	0.01%	8.02%	9.41%	10.53%	11.96%	13.63%	460.32%	11.42%
2020	1764	0.02%	20.33%	24.64%	29.03%	33.07%	37.55%	459.62%	29.11%
2019	1706	0.01%	7.89%	9.83%	11.33%	13.11%	15.47%	928.12%	13.12%
2018	1609	0.00%	10.16%	11.43%	12.80%	14.32%	16.81%	118.96%	13.10%
2017	1516	0.00%	6.29%	7.20%	8.19%	9.21%	10.26%	68.88%	8.34%
2017-2023		0.02%	13.31%	15.21%	17.02%	18.99%	21.28%	478.55%	18.20%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	1969	-157.882	-0.077	0.308	0.660	0.908	1.090	5.134	0.489
2022	1930	-5.124	-1.429	-1.144	-0.828	-0.566	-0.318	3.183	-0.851
2021	1866	-4.220	0.960	1.464	1.878	2.238	2.576	7.861	1.821
2020	1764	-2.454	-0.351	-0.198	-0.009	0.285	0.612	2.609	0.065
2019	1706	-2.747	0.951	1.424	1.881	2.252	2.628	15.129	1.842
2018	1609	-5.638	-1.820	-1.507	-1.222	-0.994	-0.727	219.406	-1.116
2017	1516	-1.759	0.673	1.026	1.428	1.931	2.527	183.351	1.634
2017-2023		-71.606	-0.159	0.609	1.461	2.212	2.806	6.365	1.325

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	1969	-203.581	-0.009	0.052	0.101	0.154	0.216	115.643	-0.001
2022	1930	-68.962	-0.461	-0.295	-0.174	-0.110	-0.043	22.296	-0.295
2021	1866	-3870.291	0.122	0.181	0.232	0.304	0.434	15065.073	6.666
2020	1764	-1.846	-0.147	-0.065	-0.002	0.077	0.187	1125.552	0.651
2019	1706	-2161.193	0.121	0.188	0.238	0.301	0.416	13.844	-3.497
2018	1609	-335.976	-0.466	-0.308	-0.201	-0.142	-0.098	6.231	-0.499
2017	1516	-73.121	0.058	0.101	0.151	0.242	0.438	53.585	0.108
2017-2023		-2096.169	-0.022	0.126	0.294	0.447	0.612	2145.971	-3.694

Indonesia

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	247	-95.35%	-18.92%	-6.26%	-0.01%	4.00%	6.33%	24.92%	-3.66%
2022	236	-78.10%	-11.94%	-4.17%	1.64%	6.03%	10.34%	33.71%	-0.55%
2021	229	-56.32%	-12.39%	-5.56%	-0.90%	4.79%	16.36%	72.38%	0.51%
2020	225	-147.58%	-24.84%	-10.24%	-6.49%	-1.04%	10.90%	37.85%	-8.04%
2019	220	-199.64%	-89.78%	-5.58%	-1.10%	2.62%	8.74%	70.93%	-16.69%
2018	198	-26.67%	-11.01%	-8.81%	-5.22%	1.04%	5.44%	29.92%	-3.37%
2017	180	-22.81%	-1.13%	5.56%	11.80%	15.96%	19.53%	159.51%	11.02%
2017-2023		-340.55%	-104.61%	-28.91%	-3.25%	9.96%	24.01%	113.30%	-20.58%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	247	1.67%	6.54%	7.75%	8.95%	11.35%	14.32%	29.35%	9.78%
2022	236	1.30%	6.79%	10.60%	13.31%	14.88%	17.00%	38.75%	12.93%
2021	229	1.58%	9.01%	10.45%	11.86%	13.96%	20.30%	75.17%	13.93%
2020	225	6.57%	19.00%	28.18%	32.86%	35.76%	40.99%	77.56%	32.08%
2019	220	2.47%	10.66%	11.62%	13.07%	18.71%	32.73%	84.71%	18.07%
2018	198	0.07%	9.58%	11.82%	13.21%	15.90%	23.27%	108.90%	15.12%
2017	180	2.02%	5.99%	6.90%	8.12%	12.46%	26.66%	144.52%	12.81%
2017-2023		7.73%	13.11%	14.92%	16.68%	18.94%	25.63%	58.96%	18.48%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	247	-4.989	-2.493	-1.485	-0.762	-0.303	-0.036	1.130	-1.062
2022	236	-4.728	-2.031	-0.794	-0.206	0.127	0.497	1.775	-0.517
2021	229	-3.699	-1.346	-0.780	-0.370	0.096	0.882	2.524	-0.333
2020	225	-3.468	-1.473	-0.452	-0.328	-0.183	0.231	1.381	-0.417
2019	220	-5.149	-3.350	-0.994	-0.634	-0.305	0.178	2.480	-0.925
2018	198	-104.953	-1.374	-1.180	-0.797	-0.385	-0.106	1.352	-1.264
2017	180	-2.829	-0.576	-0.033	0.603	1.243	1.675	2.467	0.552
2017-2023		-9.187	-6.470	-4.514	-2.957	-2.174	-1.355	2.936	-3.356

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	247	-34.465	-0.037	0.093	0.130	0.199	0.335	7.110	-0.028
2022	236	-12.559	0.117	0.198	0.258	0.319	0.443	4.205	0.268
2021	229	-6.750	0.101	0.133	0.184	0.280	0.550	43.787	0.448
2020	225	-2.398	0.099	0.309	0.415	0.497	0.665	7.429	0.454
2019	220	-382.492	0.091	0.133	0.169	0.358	3.035	46.707	-1.044
2018	198	-14.860	0.069	0.136	0.169	0.282	0.953	31.897	0.574
2017	180	-41.271	0.060	0.078	0.112	0.325	3.768	47.232	1.432
2017-2023		-528.118	0.156	0.196	0.237	0.378	1.916	15.725	-1.510

Malaysia

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	146	-15.94%	-2.30%	0.41%	2.91%	6.52%	9.25%	17.89%	3.12%
2022	146	-44.20%	-24.18%	-17.60%	-11.31%	-5.81%	-1.61%	28.31%	-12.09%
2021	143	-45.57%	-7.68%	-2.47%	1.43%	5.15%	12.17%	44.67%	1.66%
2020	141	-19.12%	-2.75%	3.67%	9.73%	18.90%	29.85%	83.55%	12.41%
2019	139	-45.24%	-3.41%	-1.22%	3.36%	9.83%	16.33%	33.82%	4.98%
2018	138	-52.09%	-28.84%	-23.68%	-16.57%	-11.82%	-8.63%	2.59%	-17.97%
2017	135	-42.47%	0.57%	4.32%	8.51%	13.86%	19.31%	29.80%	8.88%
2017-2023		-86.74%	-28.88%	-16.06%	-1.02%	15.53%	34.65%	84.19%	0.60%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	146	4.24%	5.56%	6.57%	7.65%	9.95%	12.26%	21.61%	8.46%
2022	146	4.64%	10.11%	11.74%	13.05%	14.55%	17.60%	30.19%	13.44%
2021	143	6.00%	7.53%	8.68%	10.81%	13.73%	16.37%	59.89%	11.91%
2020	141	9.95%	17.61%	20.20%	25.95%	31.45%	37.35%	46.49%	26.52%
2019	139	3.57%	5.24%	6.18%	7.53%	9.93%	12.06%	33.42%	8.37%
2018	138	5.39%	8.01%	9.29%	11.48%	13.82%	16.48%	23.44%	11.89%
2017	135	2.98%	4.79%	6.07%	7.54%	9.86%	11.34%	74.03%	8.49%
2017-2023		6.29%	10.37%	11.48%	13.64%	15.81%	20.02%	33.30%	14.34%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	146	-2.080	-0.793	-0.372	-0.040	0.319	0.742	1.460	-0.030
2022	146	-3.138	-1.839	-1.559	-0.996	-0.707	-0.326	1.746	-1.068
2021	143	-1.972	-0.798	-0.385	-0.047	0.363	0.845	2.562	-0.026
2020	141	-0.963	-0.179	0.073	0.352	0.644	0.823	2.332	0.347
2019	139	-1.655	-1.008	-0.522	0.013	0.787	1.494	2.393	0.147
2018	138	-3.974	-2.626	-2.198	-1.739	-1.413	-1.085	-0.073	-1.830
2017	135	-1.511	-0.276	0.126	0.755	1.567	2.280	4.057	0.898
2017-2023		-6.499	-3.778	-2.838	-1.618	-0.462	0.874	3.840	-1.618

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	146	-3.935	-0.102	-0.048	-0.003	0.079	0.188	109.082	0.817
2022	146	-2.852	-0.523	-0.259	-0.143	-0.075	-0.039	0.631	-0.235
2021	143	-26.168	-0.341	-0.063	-0.013	0.052	0.292	12.683	-0.062
2020	141	-0.376	-0.075	0.016	0.123	0.362	0.760	2.968	0.231
2019	139	-9.775	-0.216	-0.080	-0.009	0.175	0.607	5.729	0.078
2018	138	-74.033	-1.203	-0.510	-0.296	-0.171	-0.121	0.185	-1.212
2017	135	-24.638	-0.107	0.019	0.111	0.234	0.410	2.546	-0.165
2017-2023		-4.283	-1.121	-0.650	-0.332	-0.114	0.313	1.587	-0.430

Thailand

Annualized Return

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	269	-24.15%	-17.49%	-15.14%	-12.37%	-9.18%	0.06%	13.32%	-10.93%
2022	265	-52.45%	-11.70%	-5.54%	-0.40%	2.73%	4.96%	13.25%	-3.05%
2021	251	-19.97%	3.89%	9.25%	14.78%	19.92%	29.30%	55.41%	15.34%
2020	246	-31.17%	-16.40%	-14.46%	-10.85%	-3.94%	7.18%	21.96%	-8.16%
2019	224	-11.77%	-3.46%	-0.13%	2.35%	4.91%	8.30%	22.10%	2.67%
2018	215	-39.91%	-25.13%	-18.49%	-12.38%	-8.64%	-5.85%	11.97%	-13.70%
2017	201	-21.86%	2.78%	8.18%	13.97%	17.38%	19.28%	28.75%	12.38%
2017-2023		-65.88%	-27.84%	-18.62%	-7.60%	5.51%	15.20%	51.23%	-6.56%

Annualized Monthly Standard Deviation

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	269	0.77%	8.23%	9.17%	10.36%	12.89%	16.81%	25.64%	11.56%
2022	265	2.09%	8.16%	8.93%	9.67%	11.11%	14.08%	28.41%	10.77%
2021	251	1.06%	10.32%	12.36%	13.87%	14.79%	17.48%	27.88%	13.85%
2020	246	2.92%	25.20%	29.10%	30.92%	33.64%	36.65%	44.47%	30.82%
2019	224	1.03%	7.94%	8.76%	9.56%	10.46%	11.90%	17.46%	9.68%
2018	215	0.32%	8.85%	11.34%	13.73%	15.27%	17.20%	28.54%	13.30%
2017	201	1.04%	5.41%	6.27%	7.70%	10.01%	12.20%	44.52%	8.51%
2017-2023		2.18%	13.37%	14.56%	15.75%	17.40%	19.89%	25.72%	16.16%

Sharpe Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	269	-2.730	-2.045	-1.741	-1.501	-0.983	-0.176	0.576	-1.312
2022	265	-2.376	-1.009	-0.618	-0.162	0.208	0.468	1.144	-0.235
2021	251	-2.421	0.242	0.644	1.044	1.466	2.238	3.745	1.098
2020	246	-1.779	-0.568	-0.504	-0.391	-0.151	0.235	2.839	-0.297
2019	224	-2.825	-0.533	-0.184	0.067	0.341	0.695	2.205	0.067
2018	215	-29.233	-1.833	-1.476	-1.107	-0.805	-0.534	1.514	-1.257
2017	201	-1.000	0.244	0.905	1.580	2.144	2.631	6.557	1.513
2017-2023		-9.886	-2.380	-1.786	-1.066	-0.270	0.327	3.208	-1.060

Treynor Ratio

Period	n	Min	10th %tile	Q1	Median	Q3	90th %tile	Max	Mean
2023	269	-0.616	-0.261	-0.184	-0.146	-0.113	-0.037	0.303	-0.147
2022	265	-19.689	-0.312	-0.100	-0.014	0.022	0.045	0.780	-0.219
2021	251	-10.700	0.039	0.103	0.158	0.222	0.425	10.098	0.197
2020	246	-0.502	-0.166	-0.144	-0.111	-0.046	0.064	0.287	-0.084
2019	224	-0.240	-0.050	-0.016	0.008	0.034	0.091	0.709	0.026
2018	215	-2.026	-0.377	-0.212	-0.138	-0.091	-0.071	0.066	-0.199
2017	201	-1.136	0.026	0.110	0.204	0.257	0.401	41.072	0.437
2017-2023		-2.223	-0.597	-0.306	-0.187	-0.042	0.079	0.756	-0.231