The Relationship Between Return of Sustainable Funds and Total Expense Ratio, Evidence in Thailand

Chayapon Niyomkaew*, Nada Chunsom** and Natthapong Jungteerapanich***

บทคัดย่อ

This article examines the relationship between the returns of sustainable funds and the total expense ratio in the context of sustainable mutual funds in Thailand by employing regression and multiple regression models to construct models. The aim is to test whether the total expense ratio of funds is related to the performance of sustainable funds registered in Thailand. The goal is to support investors, stakeholders, and decision-makers in making sustainable investment decisions in Thailand. It delves into the details of the total expense ratio and returns of recognized and sustainability-rated funds, which will contribute to fostering a more sustainable and socially responsible investment environment in the Thai context. The outcomes of this research will enhance the knowledge about sustainable mutual funds in Thailand by exploring the complexities of the interaction between fund expenses and performance by studying various types of funds recognized as sustainable. The research focuses on elucidating the factors influencing investment decisions, with the main variable being the expenses of mutual funds and other variables in the multiple regression models, such as the Sharpe ratio, standard deviation, and sustainability rating by Morningstar. The results from the regression model and the multiple regression model with additional control variables are consistent, indicating that the total expense ratio can partially explain the returns of sustainable mutual funds in the Thai market over 3 years with a significant level.

คำสำคัญ: Sustainable Funds, Total Expense Ratio, Morningstar Sustainability Ratings

* Student - School of Development Economics, National Institute of Development Administration, 148 M.3, Seri-Thai Road, Klongchan, Bangkapi, Bangkok 10240, Thailand, E-mail: chayyaponn@gmail.com

** Assistant Professor - School of Development Economics, National Institute of Development Administration, 148 M.3, Seri-Thai Road, Klongchan, Bangkapi, Bangkok 10240, Thailand, E-mail: chayyaponn@gmail.com

*** Teacher - School of Engineering, King Mongkut's Institute of Technology Ladkrabang, 1 Chalong Krung, 1 Alley, Ladkrabang, Bangkok 10520, Thailand, E-mail: natthapong.ju@kmitl.ac.th

ความสัมพันธ์ระหว่างอัตราค่าใช้จ่ายรวม และผลตอบแทนของกองทุนความยั่งยืน ในประเทศไทย

ชยพล นิยมแก้ว* ณดา จันทร์สม** และ นัทธพงศ์ จึงธีรพานิช***

Abstract

บทความนี้ศึกษาความสัมพันธ์ระหว่างผลตอบแทนของกองทุนยั่งยืนและอัตราค่าใช้จ่ายรวมในบริบท ของกองทุนรวมยั่งยืนในประเทศไทย โดยใช้แบบจำลองการถดถอยและแบบจำลองการถดถอยพหุคูณ ในการสร้างโมเดล มีเป้าหมายเพื่อทดสอบว่าอัตราค่าใช้จ่ายรวมของกองทุนมีความสัมพันธ์กับต่อ ผลการดำเนินงานของกองทุนยั่งยืนที่จดทะเบียนในประเทศไทยหรือไม่ เพื่อเป็นข้อมูลสนับสนุน นักลงทุน ผู้มีส่วนได้ส่วนเสีย และผู้มีอำนาจตัดสินใจในการตัดสินใจเกี่ยวกับการลงทุนอย่างยั่งยืนใน ประเทศไทย โดยลงรายละเอียดไปยังอัตราส่วนค่าใช้จ่ายรวมและผลตอบแทนของกองทุนที่ได้รับการ ยอมรับและจัดอันดับความยั่งยืน ซึ่งจะเป็นส่วนเสริมให้เกิดสภาพแวดล้อมการลงทุนที่ยั่งยืน และมีความ รับผิดชอบต่อสังคมมากขึ้นในบริบทของประเทศไทย ผลการศึกษาจะเป็นการเสริมสร้างองค์ความรู้ เกี่ยวกับกองทุนรวมยั่งยืนในประเทศไทยโดยสำรวจความซับซ้อนของปฏิสัมพันธ์ระหว่างค่าใช้จ่าย ของกองทุนและผลการดำเนินงาน ผ่านการศึกษาประเภทต่าง ๆ ของกองทุนรวมที่ได้รับการยอมรับ ในฐานะกองทุนยั่งยืน โดยงานวิจัยมุ่งเน้นไปที่การชี้แจงปัจจัยที่มีอิทธิพลต่อการตัดสินใจลงทุนโดยมี ตัวแปรหลัก คือ ค่าใช้จ่ายของกองทุนรวมและตัวแปรอื่น ๆ ในโมเดลถดถอยหลายตัวแปร เช่น อัตราส่วน ของชาร์ป ส่วนเบี่ยงเบนมาตรฐาน และระดับความยั่งยืนที่ได้รับการจัดอันดับโดยมอร์นิ่งสตาร์ โดย ผลการศึกษาจากสมการถดถอยและสมการถดถอยหลายตัวแปรที่มีตัวแปรควบคุมเพิ่มเติมเป็นไป ในทิศทางเดียวกัน แสดงให้เห็นว่าอัตราส่วนค่าใช้จ่ายรวมสามารถอธิบายส่วนหนึ่งของผลตอบแทน กองทุนรวมที่เน้นเรื่องความยั่งยืนในตลาดไทยในระยะเวลา 3 ปีอย่างมีนัยสำคัญ

Keywords: กองทุนยั่งยืน, อัตราส่วนค่าใช้จ่ายรวม, ระดับความยั่งยืน, มอร์นิ่งสตาร์

* นักศึกษา - คณะพัฒนาการเศรษฐกิจ สถาบันบัณฑิตพัฒนบริหารศาสตร์, เลขที่ 148 หมู่ 3 ถนนเสรีไทย แขวงคลองจั่น เขตบางกะปิ กรุงเทพมหานคร 10240 E-mail: chayyaponn@gmail.com
** รองศาสตราจารย์ - คณะพัฒนาการเศรษฐกิจ สถาบันบัณฑิตพัฒนบริหารศาสตร์, เลขที่ 148 หมู่ 3 ถนนเสรีไทย แขวงคลองจั่น เขตบางกะปิ กรุงเทพมหานคร 10240 E-mail: nada@nida.ac.th
*** อาจารย์ประจำคณะ - คณะวิศวกรรมศาสตร์ สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง, เลขที่ 1 ซอยฉลองกรุง 1 ถนนฉลองกรุง แขวงลาดกระบัง เขตลาดกระบัง กรุงเทพมหานคร 10520 E-mail: natthapong.ju@kmitl.ac.th

1. Introduction

1.1 Background

The financial market in Thailand has experienced a noticeable increase in attention towards ESG investments. Current issues like climate change, societal disparities, and controversies in corporate governance have motivated investors to explore sustainable options. In this context, ESG funds have surfaced as a feasible channel for harmonizing financial gains with favorable societal and environmental impacts; for instance, incorporating ESG factors into investment strategies has been shown to enhance stock returns and improve investment decisions (Marupanthorn et al., 2024).

In the contemporary Thai business and finance landscape, the Environmental, Social, and Governance (ESG) concept has gained significant prominence. Investors are increasingly drawn to companies that genuinely prioritize ESG objectives. Business leaders recognize the significance of integrating ESG considerations into organizational strategies. The Sustainable Development Goals (SDG) Index of Thailand has shown improvement, positioning the country at the 43rd spot out of 166 nations with a score of 74.7, Showing that Thailand is significantly developing in the aspect of sustainable investment quality (The Government Public Relations Department, 2023).

Moreover, evidence from the Thailand ESG and Sustainability Survey shows that 34% of survey respondents have already established sustainability committees to oversee or drive ESG initiatives within their businesses. The survey findings reveal that business leaders predominantly view improved sustainability practices as yielding positive impacts across three key areas: operational efficiency and cost reduction, brand image and credibility, and risk management (Deloitte, 2022).

1.2 Statement of Problems

The concept of sustainable and socially responsible investing has gained significant global attention, and the concept of sustainable mutual funds has also gained attraction in Thailand. Although a novel idea, sustainable investing has experienced remarkable growth, driven by heightened investor awareness and an emphasis on environmental, social, and governance (ESG) factors (Deloitte, 2022). The rapid growth of interest in this matter has led the author to conduct in-depth research studies on the intricacies of the performance of sustainable funds,

including factors of Total Expense Ratio (TER) and others that could impact sustainable fund performance.

One pivotal factor that has been extensively researched is the relationship between fund returns and the Total Expense Ratio (TER). The TER, encompassing various fees and expenses associated with managing a mutual fund, has been a subject of debate. Research on stock mutual funds between 2013 to 2015 in Indonesia, concluded that the Total expense ratio has no significant effect on stock funds' performance (Lidyah, 2017), with conflicting findings emerging across different markets by a relationship between the Total Expense Ratio and the 5-year performance for the U.S. market and the Swedish market could be confirmed (Cheraghi & Sundqvist, 2022).

Building upon this foundation, the present research aims to delve deeper into the Thai sustainable fund landscape, leveraging regression models to investigate the relationship between 3-year returns and the TER. By employing multiple regression analysis to compare with the previous studies, this work seeks to uncover potential correlations and determine the impact of the TER on the performance of sustainability funds registered in Thailand.

1.3 Research Objectives

The design of this study has been approached from the perspective of private investors to present research findings to private investors so they can use them as guidance for sustainable mutual fund investments. Additionally, the results of this study will be presented to a target group, aiming to understand whether higher expense ratios will lead to better efficiency in sustainable mutual funds or not, with the following goals.

1. To assess whether there is a statistically significant relationship exists between the 3-year return and TER in sustainability funds in Thailand.

2. To explore the implications of expense ratios on fund performance, considering the unique context of sustainability-focused investments.

By contributing to the growing further studies of knowledge surrounding sustainable mutual funds in Thailand, this research attempts to clearly explain the complex relationship between sustainable fund costs (TER) and the performance of registered funds in Thailand. Otherwise,

the findings may empower stakeholders to navigate the evolving landscape of sustainable investing more strategically, promoting a future where financial returns and societal impact coexist.

1.4 Contribution

This research aims to further explore the relationship between expense ratios and the performance of mutual funds. Previous studies have calculated outcomes from various mutual fund groups in different countries, yielding diverse results in each study and country. The researcher's objective is to study this relationship in the group of sustainable mutual funds in Thailand, as there is a desire to understand the direction of the relationship between expense ratios and mutual fund performance in Thailand, with a particular interest in sustainable funds that stand out due to their unique characteristics and varying fund expenses, which are gaining popularity and attention from investors.

This work is an exploration of investments in the group of funds recognized as Sustainability, delving into the performance of various types of mutual funds registered in Thailand. It aims to support factors influencing investment decisions, such as mutual fund expenses. Understanding the dynamics and differences of sustainable mutual funds is crucial for investors, stakeholders, and those shaping the future of sustainable investment in Thailand.

The study contributes to the existing body of knowledge by providing insights into the relationship between expense ratios and the performance of sustainable mutual funds in Thailand. It offers valuable information for investors, fund managers, and policymakers in the Thai mutual fund industry. The findings can help guide investment decisions and inform the development of sustainable investment strategies in Thailand.

1.4 Scope of the Study

The scope of this study involves researching the sustainable mutual funds registered in Thailand, by gathering data regarding the selection basis of sustainable funds will be based on the database on Morningstar Direct from the period last 3 years until the last month, until 11 April 2024. This assessment considers securities in the fund portfolio with a focus on their environmental, social, and governance (ESG) practices classified by the Morningstar Sustainable Rating. which will be selected by the funds including average and beyond the

average funds on Morningstar Sustainability Rating score, The selection criteria were influenced by previous research, such as the example of (Cheraghi & Sundqvist, 2022), which collected data from the Swedish and American markets by referring to the excess standard value using 'The criteria for selection will be an ESG-rating of ≥50. While some evidence categorizes the mutual funds based on their Morningstar Sustainability Ratings using funds with ratings of 4 or 5 globes can be classified as "sustainable," while those with lower ratings (1-3 globes) can be considered "non-sustainable" or "conventional." (Hartzmark & Sussman, 2019; El Ghoul & Karoui, 2017).

The Morningstar Sustainable Rating is expressed as a numeric score from 1 to 5, with 5 being the highest rating, broken down into the following categories: 5 globes: High Sustainable Rating, 4 globes: Above Average, 3 globes: Average, 2 globes: Below Average, 1 globe: Low Sustainable Rating (Morningstar, 2021). This work Determines the threshold for classifying a fund as "sustainable." by assigning the Morningstar Sustainable Ratings on a scale of 5 to 3 globes over 601 samples, the fund with 5 globes being the highest rating and representing funds with the highest ESG performance. For the scaling purpose of the data sample, the conventional fund rating on 3 globes as the sustainable fund which is still on the average score will be included in this work.

2. Literature Review
2.1 Related Theory & Financial Formulas
2.1.1 Efficient Market Hypothesis (EMH)

Eugene Fama's Efficient Market Hypothesis (EMH), formulated in the 1960s, remains a cornerstone of financial theory. It posits that markets are highly efficient, making it nearly impossible for investors to consistently achieve superior returns by exploiting available information. by three forms of EMH, the weak form, where historical data is already reflected in prices; the semi-strong form, where all public information is rapidly incorporated; and the strong form, where all information (public and private) is swiftly priced in (Fama, 1965). While EMH provides a foundational understanding, its complete applicability across markets is debated. some studies have explored the applicability of EMH in various markets, including those in Thailand. However, evidence regarding the complete efficiency of these markets still needs to be conclusive. While some studies support the efficiency of the Thai stock market (Chiang & Zheng, 2010), others find instances of inefficiencies, particularly in the presence of

unique market conditions and information asymmetry (Pukthuanthong & Roll, 2009). This suggests that while EMH provides a foundational understanding, its application and validity may be influenced by specific market contexts and conditions.

2.1.2 Modern Portfolio Theory (MPT)

Modern Portfolio Theory (MPT) was originally developed by Harry Markowitz in 1952 and revolutionized finance by offering a systematic approach to portfolio construction. It prioritizes the interaction of assets within a diversified portfolio, seeking to optimize asset allocation for maximum expected return at a given risk level or vice versa. The concept of the efficient frontier is pivotal, representing portfolios that provide the highest expected return for a defined risk or the lowest risk for a given expected return. MPT underscores diversification, emphasizing that combining non-correlated assets improves the overall risk-return profile. Risk is assessed in terms of an asset's contribution to the portfolio, considering correlations with other assets. Beta, indicating an asset's sensitivity to market movements, is another key MPT element. While MPT has been influential, criticisms include reliance on assumptions that might not always hold, such as constant correlations and normal distributions. Nevertheless, MPT remains a foundational framework guiding portfolio management strategies, despite ongoing refinement in response to market dynamics and behavioral considerations.

2.1.3 Sustainability Index

Berg, Kölbel, & Rigobon (2019) explored the divergence among five major environmental, social, and governance (ESG) rating agencies in their study. Their findings revealed significant disagreement across these agencies, stemming from substantial differences in measurement approaches and assessment variations. Consequently, research examining the relationship between ESG ratings and fund performance may yield different results depending on which rating agency's data is utilized.

However, the Thai ESG Funds landscape presents a unique challenge. Here, the availability and standardization of ESG data might be less developed compared to more mature markets. This could potentially limit the comprehensiveness of ESG ratings assigned by these international providers to Thai funds. Both MSCI and Morningstar have effectively captured the core aspects of ESG performance despite some variations in their information-gathering processes. While both utilize robust frameworks, there might be subtle differences in the specific criteria and data points considered. This can lead to slight discrepancies in how cer-

tain funds are categorized within their respective ESG indexes. This work will define the area of the sustainable fund with the Morningstar Sustainability Rating, for the primary rationale is that it is an extensive recognition rating and comprehensive applicability, particularly within the Thai market. A follow-up study might be that of testing whether different agencies' ESG ratings, such as Thai ESG Funds, are associated with the differences in performance.

2.1.4 Morningstar Sustainability Rating

The Morningstar Sustainability Rating (MSR) has gained widespread acceptance and application within the investment community (Steen, 2019). This rating system, established in 2016, measures how effectively a portfolio's holdings manage their environmental, social, and governance (ESG) risks and opportunities relative to their Morningstar Category peers (Morningstar, 2021).

The MSR aims to address the growing demand for transparency and standardization in ESG ratings, which was highlighted by Friede, Busch, and Bassen (2015) as a crucial need to combat greenwashing in sustainable industries. Morningstar publishes a detailed methodology document outlining its rating process and data sources, aiming to increase transparency and reliability (Morningstar, 2021). A study conducted by Clark, Feiner, and Viehs (2015), summarizing results from over 200 academic studies and sources, corroborates the findings of Fulton, Kahn, and Sharples (2012) – companies that score well in terms of sustainability tend to exhibit better performance and less associated risk.

The theoretical foundation of the MSR draws upon the concept of sustainable investing, which considers the ESG factors alongside traditional financial metrics in investment decision-making processes. By incorporating these non-financial factors, the rating system aims to provide a comprehensive assessment of a portfolio's sustainability performance (Eccles & Klimenko, 2019).

2.1.5 Standard Deviation

In simpler terms, it serves to quantify the excess return achieved in comparison to the augmented risk, represented by volatility, associated with holding a more precarious asset (Sharpe, 1966). Consequently, in principle, an individual should aim to possess a portfolio boasting the highest Sharpe ratio, as it signifies optimal efficiency. A growth-oriented or emerging market fund is likely to have greater volatility and will have a higher standard

deviation (Bekaert & Harvey, 1997). A study of the relationship between volatility and bond fund performance found a negative significant relationship between volatility and bond fund performance (Lee, 2013). Therefore, it is inherently riskier than what will be the impact of this model on different market types. The previous research by Ashraf & Sharma (2014) investigated the risk-return relationship in Indian equity mutual funds. Their study employed a regression model, incorporating both Sharpe Ratio and Standard Deviation (S.D.) as the independent variables to analyze their impact on fund returns. Inspired by this approach, we have chosen to utilize both variables as control variables within the multiple linear regression to analyze influencing factors on equity mutual fund returns in Thailand. The study found that total risk, measured by standard deviation, had a negative influence on returns. Funds with higher standard deviation tended to have lower returns.

2.1.6 Sharpe Ratio

The Sharpe ratio, introduced by Sharpe in 1966, is a widely recognized tool for assessing expected returns relative to risk. It is derived from the Capital Asset Pricing Model (CAPM) equation. This ratio plays a crucial role in evaluating the risk-adjusted performance of mutual funds in Thailand. Numerous studies have utilized this metric to analyze the efficiency and effectiveness of Thai funds. For example, the study of Hensawang (2022) employed the Sharpe ratio to evaluate mutual fund performance.

The formula for the Sharp Ratio is the following.

$$\text{Sharpe Ratio} = \frac{Rx - Rf}{StdDev\ Rx}$$

Whereas in this equation, Rp is the return for the portfolio (expected return for asset p), Rf is the risk-free rate σp would be the StDev (standard deviation) for the asset over a given period. The measurement has all the basis for comparing the risk-adjusted performance regarding different assets; a high Sharpe ratio in this context would assume that it has a higher risk-adjusted return (Bednarek et al., 2016).

2.2 Related Research

Numerous studies have explored the relationship between mutual fund performance and various fund characteristics, including the Total Expense Ratio (TER). However, findings have been mixed, with some researchers identifying a negative relationship between TER and fund

returns (Cheraghi & Sundqvist, 2022; Çitak (2009), Haslem, 2018), while others found a positive association (Bahl, 1971) or no significant relationship (Lidyah, 2017). There are inconclusive findings on the relationship between these two variables, Expense Ratio, and Mutual Fund Performance.

In the context of sustainable mutual funds, Cheraghi and Sundqvist (2022) conducted a comprehensive analysis and concluded that there is a relationship between the return on sustainable mutual funds and the TER within both the U.S. and Swedish markets. Their findings suggest that higher expense ratios may negatively impact the performance of sustainable funds. Similarly, Çitak (2009) observed a negative relationship between the TER and net asset value (NAV) returns in Turkish investment companies, indicating that higher expenses could potentially diminish overall returns. Haslem (2018) also highlighted the adverse effect of higher TERs on investor earnings, calling for greater transparency and regulatory action to protect investors.

Additionally, Bahl (1971) found a positive relationship between returns and the TER in a comparative tax analysis across developing countries, suggesting that higher expense ratios may be associated with higher returns in certain contexts. However, Lidyah's study (2017) on stock mutual funds in Indonesia from 2013 to 2015 revealed that the TER had no significant effect on fund performance, although other factors like total assets and portfolio turnover exhibited influences. While the majority of studies point towards a negative correlation between TER and fund performance, some researchers have identified nuances and variations across markets, fund types, and methodological approaches. For instance, Otten and Bams (2002) suggested that higher TERs may correspond to increased returns on investment in mutual funds, but not directly on the fund's returns. The studies have employed various regression techniques, such as ordinary least squares (OLS) (Korkeamaki & Smythe, 2004), panel data analysis (Singh & Tandon, 2021), and multivariate regressions (Ferreira et al., 2013), to investigate the relationship between TER and fund performance, potentially contributing to the diversity of findings.

In the Thai market context, Wongsurawat (2011) conducted a panel data regression analysis, finding that high-risk equity funds tend to have higher fees and expenses. Manop (2016) compared the performance of bank-related and non-bank-related funds in Thailand, concluding that non-bank-related funds outperformed their counterparts, even after accounting for expenses.

Overall, the literature highlights the ongoing debate and varying perspectives on the relationship between TER and mutual fund performance, emphasizing the need for further research, particularly in the realm of sustainable investing and across different markets. These studies have contributed to understanding the relationship between Total Expense Ratio and mutual fund performance. The intricate nature of this relationship, influenced by a multitude of factors, from market dynamics to fund characteristics, underscores the need for continuous exploration and refinement of our knowledge, while this research focuses on sustainable mutual funds in Thailand, employing regression and multiple regression models to investigate whether a relationship between these variables can be established within the context of the Thai market.

3. Methodology

3.1 Data and Samples

The selections used are Morningstar Direct to collect the Total Expense Ratio (TER) and fund domicile for Thailand. To further analyze the data collection, we used Morningstar Direct as the data source; the template included the total return of 3 years to the last month, which is set from the date 2024-03-29, the Sharpe ratio for 3 years to the last month, and the Standard deviation for 3 years to last month. The variables Total Expense Ratio (TER) and Sharpe ratio for 3 years to last month, respectively, and Standard deviation for 3 years to last month for this study's independent variables. However, the Total Expense Ratio is considered the main independent variable, and the other mentioned variables will be included as control variables. The ESG score rating methodology employed in this study is based on the Morningstar Sustainability Index. Rating Distribution Curve Morningstar then maps the Portfolio Sustainability Score to a 1-5 globe rating distribution curve within each Morningstar Global Category. Funds in the best 10% get 5 globes, the next 22.5% get 4 globes, the middle 35% get 3 globes, the next 22.5% get 2 globes, and the bottom 10% get 1. Fund with ratings of 4 or 5 globes can be classified as "sustainable," while those with lower ratings (1-3 globes) can be considered "non-sustainable" or "conventional." (El Ghoul & Karoui, 2019) also suggested that for further analysis, researchers can use this binary classification (sustainable vs. non-sustainable) or treat the Morningstar Sustainability Rating as an ordinal or continuous variable, depending on the research objectives and methodology. This study's samples were drawn from 3-5 Globe-rated sustainable mutual funds, with 3 Globe-rated funds considered conventional. This decision was based on data size limitations, as funds classified as 4-5 Globe did not exhibit normal distribution characteristics.

3.2 Hypothesis

This study aims to determine whether the performance of sustainable mutual funds in the Thai market over a 3-year until last month is correlated with the overall expense ratio. The study has developed a few statistical assumptions to accomplish this objective. The syntax below are the statistical hypotheses for the linear regression models.

H0: There is no significant relation between the total expense ratio and sustainable mutual funds performance in the Thai market.

H1: There is a significant relation between the total expense ratio for sustainable mutual funds in the Thai market.

$$H_0: \beta1 = 0$$
$$H_1: \beta1 \neq 0$$

The hypothesis will be the same because the simple regression model and the multiple regression model both test the same item which is the Total Expense Ratio for sustainable mutual funds' performance.

3.3 Study Process

The research process comprises several essential stages. It begins with the formulation of a hypothesis. In this initial phase, researchers articulate a clear and testable hypothesis that serves as the guiding proposition for the study. Following the hypothesis, the next stage involves systematic data collection, where relevant information is gathered to test and validate the formulated hypothesis. Subsequently, a suitable model is chosen or developed to analyze the collected data, enabling a comprehensive exploration of the research question. The results obtained from this analysis are then examined in the context of the original hypothesis, with meticulous evaluation to either confirm or reject the initial proposition. The culmination of this process involves drawing conclusive insights and forming a coherent conclusion based on empirical findings. These results and conclusions, in turn, contribute to the broader body of theory, refining or expanding existing knowledge in the respective field of study. This cyclical and iterative process reflects a systematic progression from hypothesis formulation to the advancement of theory through empirical validation.

Hypothesis → Data Collection → Model → Results → Hypothesis confirmed or rejected → Conclusion → Confirmed Theory

3.4 Models

3.4.1 Regression Model

A regression model is a statistical tool employed to analyze the relationship between a dependent variable and one or more independent variables. The fundamental premise is to understand how changes in the independent variables impact the dependent variable. The model assumes a linear relationship, aiming to identify and quantify the strength and nature of these relationships. Multiple linear regression examines the degree of explanation in the dependent variable by two or more variables (Collis & Hussey, 2014, p.282-283).

Components of a Basic Regression Model:

$$Y_i = \beta_0 + \beta_1 X_1 + \varepsilon i$$

Dependent Variable (Y): 3-Year Performance

Independent Variable(s) (X): *Total Expense Ratio (TER)*

Regression Equation:

$$Y_i = \beta_0 + \beta_1 * Total\ Expense\ Ratio + \varepsilon_i$$

Where: Y_i = 3-year financial performance to last month

β = Measure of risk

Total expense ratio = Total cost of a managed investment fund

3.4.2 Multiple Regression Model

The Multiple Regression Model builds upon the foundation of the basic regression model, the multiple regression model extends the analysis by incorporating two or more independent variables. This advanced model acknowledges the multidimensional nature of real-world scenarios, where multiple factors simultaneously influence the dependent variable.

Components of a Basic Regression Model:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + ... \beta_n X_n + \varepsilon_i$$

Dependent Variable (Y): 3-Year Performance

Independent Variable(s) (X): *Total Expense Ratio (TER), Standard Deviation (S.D.), Sharpe Ratio, Morningstar Sustainable Index*

Regression Equation:

$$Y_i = \beta_0 + \beta_1 * Total\ Expense\ Ratio + \beta_2 * Standard\ Deviation\ (S.D.) + \beta_3 * Sharpe\ Ratio + \beta_4 * Morningstar\ Sustainable\ Index + \varepsilon_i$$

Where: Y_i = 3-year financial performance to last month

β = Measure of risk

Total expense ratio = Total cost of a managed investment fund

Sharpe ratio = A tool to understand investment return and its risk

Standard Deviation (S.D.) = The excess return achieved in comparison to the augmented risk, represented by volatility

Morningstar Sustainable Index = Sustainable rating of funds classified by the Morningstar

Overall, whether employing a basic or multiple regression model, researchers benefit from powerful tools to unveil patterns and relationships in data, with the choice contingent on the studied phenomenon's intricacies and available data characteristics. While the basic model lays a robust foundation, the multiple regression model enriches analyses by accommodating the multifaceted nature of real-world scenarios, prompting researchers to carefully weigh the associated trade-offs and nuances for deriving meaningful insights.

3.4.3 Linear Regression Model Requirement

According to Yan and Su (2009, p.195), four different requirements or assumptions must be achieved to properly evaluate the regression model's reliability and trust its conclusions. The requirements are controlled by observing the residuals that are retrieved via SPSS.

The four criteria for a valid regression model include:

1. Linearity of Residuals: A linear pattern in the residuals suggests that the model should accurately represent the linear association between the independent and dependent variables.
2. Homoscedasticity: This requirement ensures that the variance of the residuals remains constant, indicating uniform precision across the model.

3. Normal Distribution of Residuals: For the model to be considered robust, its residuals should follow a normal distribution curve.

4. Residual Independence: The residuals must not be correlated with each other and are devoid of random errors.

4. Result and Discussion

4.1 Simple Regression Model Result

The study first looked at a simple linear regression model with three-year performance as the dependent variable and Total Expense Ratio as the independent variable. In Table 1-4, the regression model shows that there is a significant relation between the last 3 years' financial return and the Total Expense Ratio in the Thai market; the relationship is significant on a 95% significance level with a significance of <0.001.

Table 1: Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	Total Expense Ratio[b]	.	Enter

a. Dependent Variable: 3 Years Performance

b. All requested variables entered.

Table 2: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.203[a]	.041	.040	7.33677	1.580

a. Predictors: (Constant), Total Expense Ratio

b. Dependent Variable: 3 Years Performance

Table 3: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1394.118	1	1394.118	25.899	<.001[b]
	Residual	32350.737	601	53.828		
	Total	33744.855	602			

a. Dependent Variable: 3 Years Performance

b. Predictors: (Constant), Total Expense Ratio

Table 4: Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.434	.765		.567	.571
	Total Expense Ratio	-2.453	.482	-.203	-5.089	<.001

a. Dependent Variable: 3 Years Performance

Table 1-4. Simple regression model testing the relationship between the total expense ratio and the 3-year performance of selected sustainable funds in Thailand.

From Table 2 Model Summary: The model summary shows an R-square value of 0.041, indicating that approximately 4.1% of the variation in the 3-year performance can be explained by the TER. From Table 3 ANOVA of Regression Model: While this is a relatively low explanatory power, the ANOVA table reveals that the overall regression model is statistically significant (F=25.899, p-value < 0.001).

Analyzing the coefficients in Table 4, from the regression model we can see that the TER has a negative standardized coefficient (Beta = -0.203) with a t-statistic of -5.089 and a p-value < 0.001. This suggests there is a statistically significant negative relationship between the TER and the 3-year performance of mutual funds. Specifically, the unstandardized coefficient of the model was -2.453 for the TER, implying that a one-unit increase in the TER is associated with a decrease of 2.453 units in the 3-year performance measure, holding all other factors constant.

The main purpose of the simple linear regression model was to answer whether H0 could be rejected from Tables 1-4 above the empirical result of the regression presented. H0 follows that there is no significant relation between the Total Expense Ratio and the 3-year performance to last month for sustainable mutual funds in the Thai market. As a result of the significance level of <0,001, the null hypothesis can be rejected at a 5% significance level. This indicates that there is a relationship between the Total Expense Ratio and the return over 3 years on the Thai market for sustainable mutual funds. However, in Table 4 there is a negative relationship between the two variables. This means that an increase in the Total Expense Ratio has a negative effect on the Three-year performance.

4.2 The model diagnostic simple regression model

Linearity

To assess the assumption of linearity, residual scatterplots were examined, as recommended by Coakes and Steed (2003). If the residuals do not exhibit a clear relationship with the predicted values, the linearity assumption is considered satisfied. By plotting the standardized predicted values (ZPRED) against the standardized residuals (ZRESID), the result of testing linearity through scatter plot diagrams is depicted in Figure 1. The scatter plot reveals no evidence of a non-linear pattern in the residuals, supporting the assumption of linearity.

Homoscedasticity

The residual scatterplots could also be used to test the assumption of homoscedasticity. If there is no clear relationship between the residuals and predicted values, the assumption of homoscedasticity should also be met. In this study, by plotting the standardized residuals against the predicted values as shown in Figure 2, the researcher found there was no clear relationship between the residuals and the predicted values. Therefore, the results suggest that the assumption of homoscedasticity should be met in this study.

Figure 2: Scatterplot which is set to determine the linear relationship for the residuals as well as detect if homoscedasticity or heteroscedasticity is present for the simple regression model based on the Thai market.

Scatterplot
Dependent Variable: 3 Years Performance
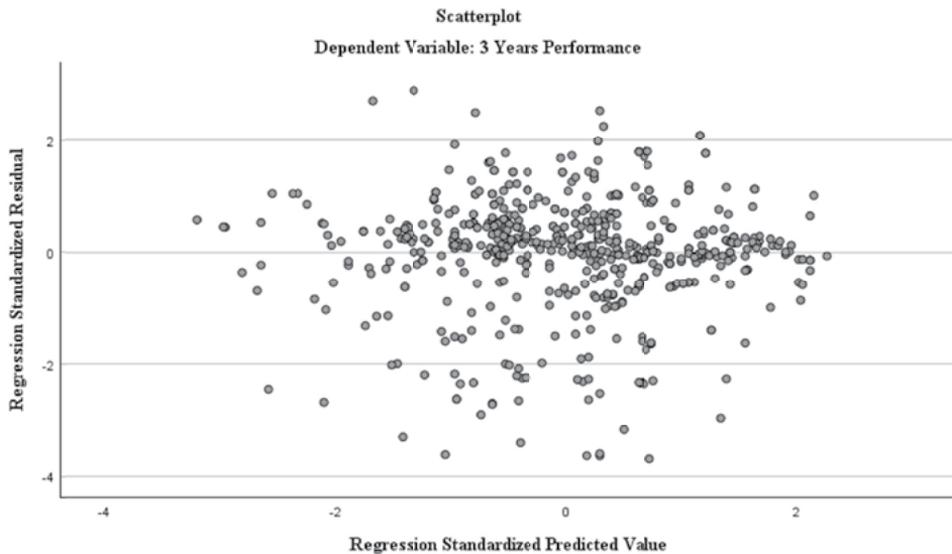
Normality

This spread should be roughly the same regardless of the fitted value on the X-axis. Ideally, see a random spread of points around the horizontal line (no clear trend upwards or down-wards). In Figure 3 the spread tends to follow the line this plot appears to depict that kind of random spread. So, Figure 3 demonstrates that the scattered residuals lie in a straight line along the normal distribution line, indicating that the residuals exhibit a normal distribution pattern.

Figure 3: Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model.

Normal P-P Plot of Regression Standardized Residual
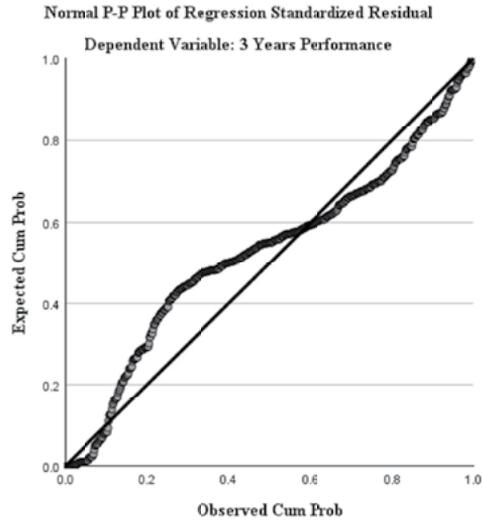Dependent Variable: 3 Years Performance

Figure 3 was observed to understand whether the residuals were normally distributed or not. To further analyze the residuals and confirm the assumptions of normal distribution. It can be detected that the residuals are following the linear equation relatively well, and no major deviation is to be detected.

Figure 4: Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model based on the Thai market.

Histogram
Dependent Variable: 3 Years Performance

Mean = 2.52E-17
Std. Dev. = 0.999
N = 603
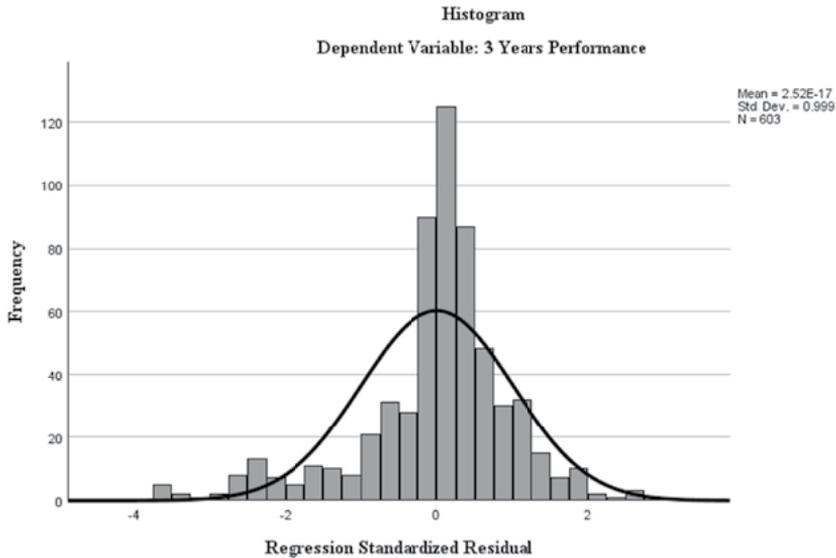
To confirm whether the residuals are independent or not, A Durbin-Watson test was performed to assess this (see Table 2). The test statistic is 1.580, which falls within an acceptable range, suggesting that the residuals are likely independent. Since the value is between 1.5 – 2.5, we can be reasonably confident that this assumption is met (as suggested by Yan & Su, 2009, p.195).

Table 5: Statistics VIF test which is set to determine if multicollinearity is present or not for the simple regression model based on the U.S. market.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.434	.765		.567	.571		
	Total Expense Ratio	-2.453	.482	-.203	-5.089	<.001	1.000	1.000

a. Dependent Variable: 3 Years Performance

Multicollinearity

To examine whether multicollinearity is present or not the coefficients in Table 5 containing "Statistics VIF" are used. The simple regression model for VIF value of 1.000, hence it can be concluded that multicollinearity is not present for this regression model as the value is below 10.

4.3 Model 2 - The Multiple Regression Result

This study also employed a multiple regression model for a deeper understanding of the factors influencing the performance of sustainable mutual funds registered in the Thai market. This approach builds upon the initial analysis examining the relationship between Total Expense Ratio and 3-year performance (to last month). To ensure consistency in the methodology and provide a more comprehensive picture, the same model framework was applied to investigate the influence of two additional variables: standard deviation and Sharpe ratio. By analyzing these three factors within the same regression model structure, we aim to assess their relative significance in explaining the 3-year performance of Thai sustainable funds.

These variables have been extensively tested in studies examining the relationship between "fund performance" and other factors. As explained in the previous section, their inclusion as control variables is justified by the relationship between the return on sustainable mutual funds and the Total Expense Ratio in Thailand as a result.

Table 6: Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.724[a]	.524	.521	5.13725

a. Predictors: (Constant), Morningstar Sustainability Rating™, Sharpe Ratio 3 Years, Total Expense Ratio (TER), Standard Deviation 3 Years

b. Dependent Variable: 3-Year Performance

Table 7: ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17126.081	4	4281.520	162.232	<.001[b]
	Residual	15570.911	590	26.391		
	Total	32696.992	594			

a. Dependent Variable: 3-Year Performance

b. Predictors: (Constant), Morningstar Sustainability Rating™, Sharpe Ratio 3 Years, Total Expense Ratio (TER), Standard Deviation 3 Years

Table 8: Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.143	1.121		5.479	<.001
	Total Expense Ratio (TER)	-1.116	.333	-.098	-3.352	<.001
	Sharpe Ratio 3 Years	4.400	.266	.474	16.520	<.001
	Standard Deviation 3 Years	-.689	.035	-.588	-19.839	<.001
	Morningstar Sustainability Rating™	.874	.311	.082	2.813	.005

a. Dependent Variable: 3-Year Performance

Table 6-8. Multiple regression model testing the relationship between the total expense ratio and the 3-year performance of selected sustainable funds in Thailand.

Table 6 presents the Model Summary, which shows an R-square value of 0.524, indicating that approximately 52.4% of the variation in the 3-Year Performance (dependent variable) can be explained by the predictor variables: Morningstar Sustainability Rating™, Sharpe Ratio 3 Years, Total Expense Ratio (TER), and Standard Deviation 3 Years.

The ANOVA table (Table 7) displays the overall significance of the regression model, with an F-statistic of 162.232 and a p-value < 0.001, suggesting that the model is statistically significant.

Table 8, the Coefficients table, provides insights into the individual predictor variables and their relationship with the dependent variable. Starting with the Total Expense Ratio (TER), has a negative standardized coefficient (Beta = -0.098) with a t-statistic of -3.352 and a p-value < 0.001, indicating a statistically significant negative relationship between TER and 3-Year Performance. Specifically, the unstandardized coefficient of -1.116 suggests that a one-unit increase in TER is associated with a decrease of 1.116 units in the 3-year performance measure, holding all other variables constant.

The Sharpe Ratio 3 Years variable exhibits a positive standardized coefficient (Beta = 0.474) with a t-statistic of 16.520 and a p-value < 0.001, reflecting a statistically significant positive relationship with 3-year performance. The unstandardized coefficient of 4.400 implies that a one-unit increase in the Sharpe Ratio 3 Years is associated with an increase of 4.400 units in the 3-year performance measure, ceteris paribus.

Furthermore, the Standard Deviation 3 Years variable has a negative standardized coefficient (Beta = -0.588) with a t-statistic of -19.839 and a p-value < 0.001, indicating a statistically significant negative relationship with 3-Year Performance. The unstandardized coefficient of -0.689 suggests that a one-unit increase in Standard Deviation 3 Years is associated with a decrease of 0.689 units in the 3-year performance measure, holding all other variables constant.

Finally, the Morningstar Sustainability Rating™ variable exhibits a positive standardized coefficient (Beta = 0.092) with a t-statistic of 2.813 and a p-value < 0.001, reflecting a statistically significant positive relationship with 3-Year Performance.

4.4 The Multiple Regression Model Diagnosis

Plotting the standardized predicted values (ZPRED) against the standardized residuals (ZRESID), the result of testing linearity through scatter plot diagrams and the scatter plot reveals no evidence of a non-linear pattern in the residuals, supporting the assumption of linearity.

Linearity & Homoscedasticity

Figure 5: The Scatterplot without the WLS weight, which is set to determine the linear relationship for the residuals and detect signs of heteroscedasticity, is present for the multiple regression model.

Scatterplot
Dependent Variable: 3 Year Performance
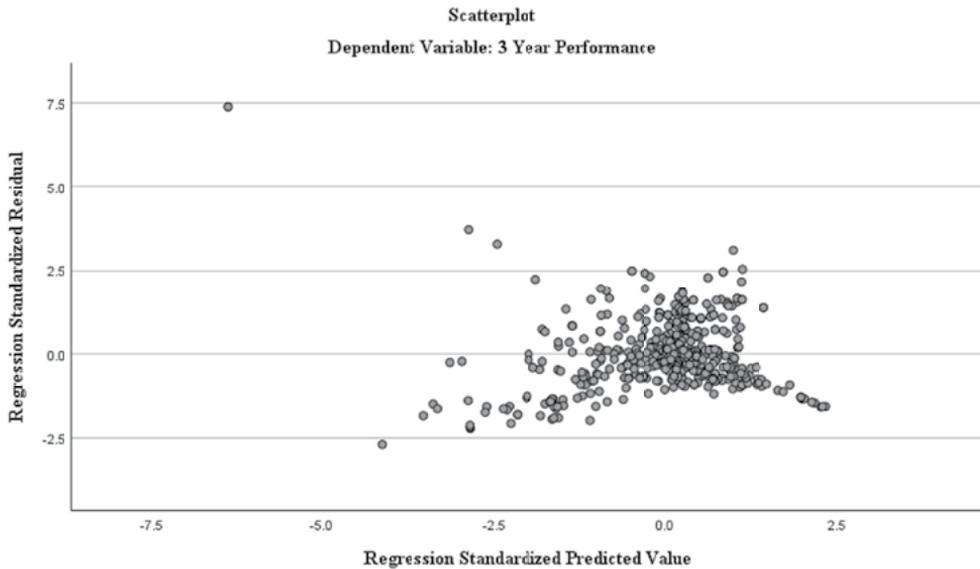
As a result, in Figure 5, The Scatterplot has no sign of a linear relationship for the residuals, and detecting signs of heteroscedasticity is present for the multiple regression model. To further investigate the issues of linearity and homoscedasticity, and to confirm their presence, a robust statistical model was developed using SPSS software. A weighted least squares (WLS) variable was created and incorporated into the data, along with the unstandardized predicted value (PER_1) obtained from a previously saved regression analysis. This new regression model allowed for a comprehensive examination of the underlying assumptions.

The weighting variable was constructed by calculating a new variable, which involved dividing (1/(PRE_1**2)) by PRE_1, where PRE_1 represented the unstandardized predicted value. This process resulted in the desired weight.

We computed the WLS weight by dividing 1 by the square of the Unstandardized Predicted Value (PRE_1) by the Formula:

$$WLS = \frac{1}{(PRE1)^2}$$

Subsequently, a new multiple regression model was executed to validate the requirements of linearity and homoscedasticity, incorporating the WLS weight. This updated model not only confirmed the presence or absence of homoscedasticity or heteroscedasticity but also significantly improved the adjusted R-square value, indicating a higher degree of explanation when the WLS weight was included in the multiple regression model (Cohen, Coren, West, & Aiken, 2003).

A scatterplot was generated through a legacy dialog to visually represent the impact of the weighted WLS. The new scatterplot, illustrated in Figure 6, which included the WLS weight, exhibited no signs of heteroscedasticity, further reinforcing the robustness of the model (Chatterjee & Hadi, 2006).

Figure 6: Scatterplot includes the WLS weight which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the multiple regression model.

Scatter Plot of Studentized Residual by Unstandardized Residual from WLS1
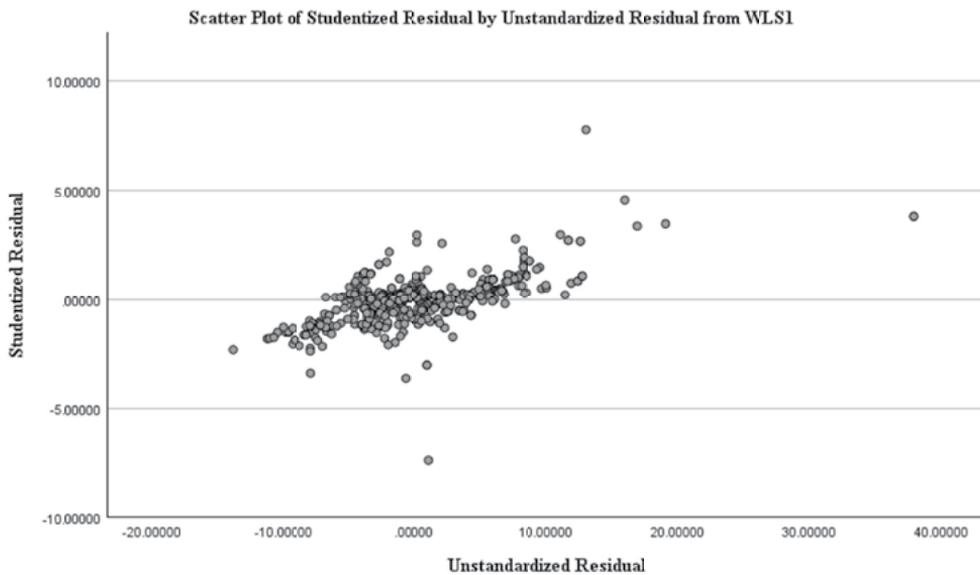
A new regression model was run that incorporated a weighted variable to determine if homoscedasticity or heteroscedasticity was present. A new scatterplot could be generated using a legacy dialog feature by including this weight in the new regression model. Figure 6 displays this updated scatterplot with the weight variable included. Upon visual inspection, this new scatterplot shows no apparent signs of heteroscedasticity. According to Studenmund (2015, p.102-103), a "cone formation" in the scatterplot indicates heteroscedasticity, which is not observed when the weight is incorporated. Therefore, it can be confirmed that heteroscedasticity is not an issue in the multiple regression model when the weight variable is added.

Normality

This spread from the multiple regression model should be roughly the same regardless of the fitted value on the X-axis. Ideally, see a random spread of points around the horizontal line (no clear trend upwards or downwards). In Figure 7 the spread tends to follow the line this plot appears to depict that kind of random spread

Figure 7: Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model.

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: 3 Year Performance
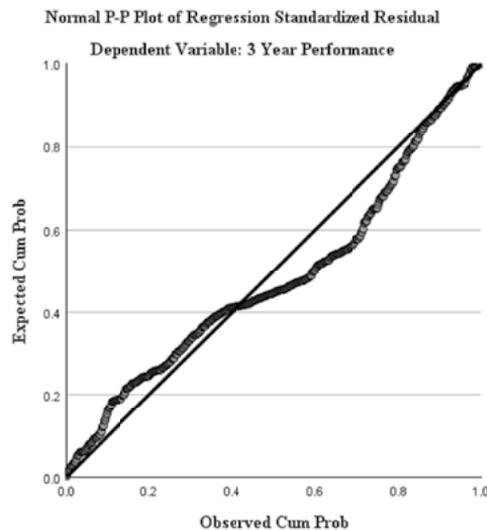
Figure 8: Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model.

Histogram
Dependent Variable: 3 Year Performance

Mean = 3.53E-16
Std. Dev. = 0.997
N = 595
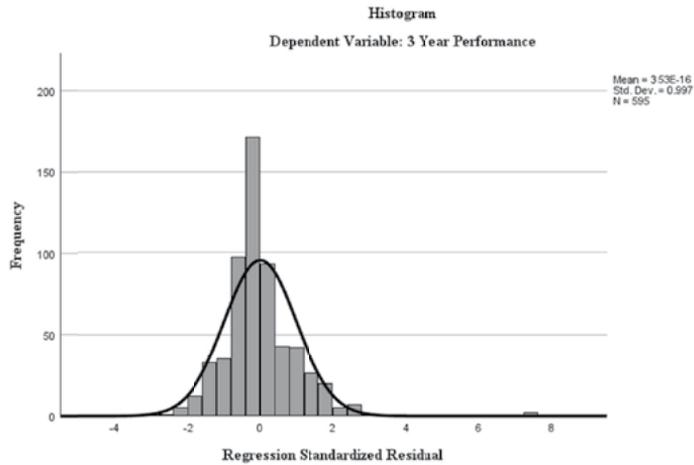
Multicollinearity

An examination of Table 9 was conducted to assess the presence of multicollinearity in the multiple regression model for the Swedish market. As established earlier in the study, a variance inflation factor (VIF) value below 10 is the threshold for confirming the absence of multicollinearity. In this case, the VIF values for all variables fall below 10. Consequently, it can be confirmed that multicollinearity does not pose a concern in the multiple regression model for the Thai market.

Table 9: Statistics VIF-test which is set to determine if multicollinearity is present or not for the multiple regression model.

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
1 (Constant)	6.143	1.121		5.479	<.001		
Total Expense Ratio (TER)	-1.116	.333	-.098	-3.352	<.001	.937	1.067
Sharpe Ratio 3 Years	4.400	.266	.474	16.520	<.001	.980	1.020
Standard Deviation 3 Years	-.689	.035	-.588	-19.839	<.001	.917	1.090
Morningstar Sustainability Rating™	.874	.311	.082	2.813	.005	.941	1.062

a. Dependent Variable: 3-Year Performance

As seen by Table 10, the value for the conducted Durbin-Watson test is at 1.813, as previously said the Durbin-Watson test is conducted to detect whether the residuals are independent or not, which must be for the regression model to be acceptable.

Table 10: Durbin-Watson test, which is set to determine the independence of the model's residuals for the multiple regression model.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.724[a]	.524	.521	5.13725	1.813

a. Predictors: (Constant), global_2, Sharpe Ratio 3 Years, Total Expense Ratio (TER), global_1, Standard Deviation 3 Years

b. Dependent Variable: 3-Year Performance

For the assumption of normality, the Shapiro-Wilk test was performed once for both models. This test determined whether the regression models follow a normal distribution. As shown in Table 11, the p-values for the 5-year performance up to the last month, the Total Expense Ratio, and the tracking error for the 3 years up to the last month all exhibited values less than

0.01. Based on the Shapiro-Wilk test criteria, these results indicate that the residuals for these variables cannot be considered normally distributed.

Table 11: Shapiro-Wilk test which is set to determine the normal distribution assumption for the multiple and simple regression model.

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total Expense Ratio (TER)	.054	595	<.001	.970	595	<.001
Sharpe Ratio 3 Years	.168	595	<.001	.520	595	<.001
Standard Deviation 3 Years	.099	595	<.001	.940	595	<.001
Morningstar Sustainability Rating™	.443	595	<.001	.589	595	<.001
3 Year Performance	.157	595	<.001	.901	595	<.001

a. Lilliefors Significance Correction

5. Conclusion

In the context of the Thai market, this study aimed to investigate the relationship between the Total Expense Ratio and the 3-year performance of sustainable mutual funds. Two regression models were employed to analyze the data. The results of both regression models were consistent, indicating a statistically significant association between the Total Expense Ratio and the 3-year performance of sustainable mutual funds in Thailand.

The result of this study suggests that the Total Expense Ratio can partially account for the performance of sustainable mutual funds in the Thai market over 3 years. This implies that mutual fund managers and individual investors in Thailand should consider the Total Expense Ratio as a factor that may influence the performance of sustainable mutual funds. By being cognizant of this relationship, fund managers can make informed decisions regarding expense ratios, and investors can incorporate this information into their investment strategies. It is important to note that while the Total Expense Ratio is a significant factor, it may not solely determine the performance of sustainable mutual funds. Other variables, such as market conditions, fund management strategies, and investor behavior, may also contribute to the overall performance of these funds. Further research is needed to explore the complex interplay of various factors influencing the performance of sustainable mutual funds in the Thai

market, even comparing this relation in the different markets.

A potential limitation of the current investigation is the possibility of survivorship bias. However, the relatively short timeframe of the study, which can collect the data in only three years, suggests this bias is likely small. This study lays the groundwork for future research that can leverage the growing availability of data to conduct more comprehensive empirical analysis incorporating sustainability criteria to another market; within Thailand, there have been significant developments of the ESG Fund since last year, which will be valuable information for further researching the Sustainable fund market in Thailand in the future.

References

Ashraf, S. H., & Sharma, D. (2014). Performance evaluation of Indian equity mutual funds against established Benchmarks index. *International Journal of Accounting Research, 2*(1). https://doi.org/10.4172/2472-114x.1000113

Bahl, R. W. (1971). A Regression Approach to Tax Effort and Tax Ratio Analysis. *IMF Staff Papers, 18*(3), 570-599.

Bednarek, Z., Patel, P., & Ramezani, C. A. (2016). Time Aggregation of the Sharpe ratio. *Journal of Asset Management, 17*(7), 540–555. https://doi.org/10.1057/s41260-016-0003-x

Bekaert, G., & Harvey, C. R. (1997). Emerging equity market volatility. *Journal of Financial Economics, 43*(1), 29–77. https://doi.org/10.1016/s0304-405x(96)00889-6

Berg, F., Kölbel, J. F., & Rigobon, R. (2022). Aggregate confusion: The divergence of ESG Ratings. *Review of Finance, 26*(6), 1315–1344. https://doi.org/10.1093/rof/rfac033

Chatterjee, S., & Hadi, A. S. (2006). *Regression Analysis by Example, 4th ed.* John Wiley & Sons.

Cheraghi, J., & Sundqvist, A. (2022). *Fees in Sustainable Mutual Funds: The relationship between the return on sustainable mutual funds and the total expense ratio in the U.S. and Sweden.* DIVA. https://umu.diva-portal.org/smash/record.jsf?pid=diva2%3A1679297&dswid=-5971

Chiang, T. & Zheng, D. (2010). An empirical analysis of herd behavior in global stock markets. *Journal of Banking & Finance.* Vol.34, Issue. 8, pp. 1911-1921.

Çitak, L. (2009), The Relationship Between Expense Ratio and Net Asset Value (NAV) Return: The Case of Turkish Investment Companies. *Marmara Üniversitesi İktisadi ve İdari Bilimler Fakultesi Dergisi,* no.1, pp.357-381.

Clark, G. L., Feiner, A., & Viehs, M. (2015, March 5). From the Stockholder to the Stakeholder: How Sustainability Can Drive Financial Outperformance. Available at SSRN: https://ssrn.com/abstract=2508281 or http://dx.doi.org/10.2139/ssrn.2508281

Coakes, S. J. & Steed, L. G. (2003). *SPSS: Analysis without anguish: Version 11.0 for Windows,* 215-224.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied Multiple Regression/ Correlation Analysis for the Behavioral Sciences,* 3rd ed. Mahwah, NJ: Lawrence Erlbaum Associates. https://doi.org/10.4324/9781410606266

Collis, J. & Hussey, R. (2014). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students,* 4th ed. Basingstoke: Hampshire.

Deloitte, 2022. *Thailand ESG and Sustainability Report 2022.* Retrieved from th-esg-sustainability-survey-report-2022.pdf

Eccles, R., & Klimenko, S. (2019). Shareholders are getting serious about sustainability. *Harvard Business Review.* May-June. pp. 106-116. Retrieved from https://hbr.org/2019/05/the-investor-revolution

El Ghoul, S. & Karoui, A. (2019). Fund Performance and Social Responsibility: New Evidence using Social Active Share and Social Tracking Error. (September 7). *Journal of Banking and Finance,* Available at SSRN: https://ssrn.com/abstract=3489201 or http://dx.doi.org/10.2139/ssrn.3489201

Fama, E. F. (1965). The behavior of stock-market price. *The Journal of Business,* Vol. 8, No. 1 (Jan), pp. 34-105.

Ferreira, M.A., Keswani, A., Miguel, A.F., & Ramos, S.B. (2013). The Determinants of Mutual Fund Performance: A Cross-Country Study. *Review of Finance, 17*(2), pp. 483–525. https://doi.org/10.1093/rof/rfs013

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment, 5*(4), 210-233. https://doi.org/10.1080/20430795.2015.1118917

Fulton, M., Kahn, B. M., & Sharples, C. (2012). Sustainable investing: Establishing long-term value and performance. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.2222740

Hartzmark, S. M. & Sussman, A. B. (2017, August 9). Do investors value sustainability? A natural experiment examining ranking and fund flows. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3016092

Haslem, J. A. (2018). Mutual fund negative general effects on shareholder performance. *The Journal of Wealth Management, 21*(1), 51–56. https://doi.org/10.3905/jwm.2018.21.1.051

Hensawang, S. M. (2022). Effect of mutual fund fundamentals and characteristics on their performance: An empirical study of thai equity mutual funds. *Cuadernos de Economía, 45,* 128 (May-August). https://cude.es/submit-a-manuscript/index.php/CUDE/article/view/255

Ketsuriyang, K. (2023, May 17). Thailand ESG and Sustainability Survey Report 2022. Deloitte Thailand. https://www2.deloitte.com/th/en/pages/about-deloitte/articles/th-esg-sustainability-survey-report-2022-th.html

Korkeamaki, T. P. & Smythe, T. I. (2004). Effects of market segmentation and bank concentration on mutual fund expenses and returns: Evidence from Finland. *European Financial Management, 10*(3), 413–438. https://doi.org/10.1111/j.1354-7798.2004.00257.x

Lee, J. (2013). Measuring the Mutual Fund Industry Risk Management and Performance Sustainability--Quantile Regression Model. *Journal of Asian Business Strategy, 3*(4), 59–68. Retrieved from https://archive.aessweb.com/index.php/5006/article/view/4066

Lidyah, R. (2017). Pengaruh Total Asset, Expense Ratio Dan Portofolio Turnover Terhadap Kinerja Reksadana Saham DI Indonesia. *I-Economics: A research journal on Islamic Economics.* Vol. 3., No. 1, 19-37.

Manop, P. (2016). *Mutual Fund in Thailand: New Evidence* (in Thai). Master Thesis. Master of Science, Thammasat University. Available at https://ethesisarchive.library.tu.ac.th/thesis/2016/TU_2016_5702112995_3701_4004.pdf

Marupanthorn, P., Termsaithong, T., Wangpratham, N., Koryanyong, J., Chanpiwat, C., & Pathomsathit, C. (2024). Development of ESG factors for enhancing factor model in the Thai Stock Market. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.4706129

Morningstar (2021). Morning Sustainability Rating: Methodology. 8 November. Retrieved from https://www.morningstar.com/content/dam/marketing/shared/research/methodology/744156_Morningstar_Sustainability_Rating_for_Funds_Methodology.pdf

Nalla, B., Kalyan, N. B., & Gautami, S. (2018). A study on risk & return analysis of the selected mutual funds schemes in India. ResearchGate. https://www.researchgate.net/publication/325710161_A_Study_on_Risk_Return_Analysis_of_the_Selected_Mutual_Funds_Schemes_In_India\

Otten, R. & Bams, D. (2002). European Mutual Fund Performance. *European Financial Management, [online] 8*(1), pp.75–101. https://doi.org/10.1111/1468 036x.00177

Pukthuanthong, K., & Roll, R. (2009). Global market integration: An alternative measure and its application. *Journal of Financial Economics, 94*(2), 214–232. https://doi.org/10.1016/j.jfineco.2008.12.004

Sharpe, W.F. (1966). Mutual fund performance. The Journal of Business, 39, 119-138.

Singh, A.B. & Tandon, P. (2021). Association between fund attributes and fund's performance: a panel data approach. *Benchmarking: An International Journal, 29*(1), pp.285–304. https://doi.org/10.1108/bij-10-2020-0545

Steen, M. (2019). The role of sustainability ratings in the assessment of responsible investment practice. *Social and Environmental Accountability Journal, 39*(2), 95-111. https://doi.org/10.1111/beer.12588

Studenmund, A.H. (2015). *Using Econometrics:A Practical Guide.* 6th Ed. Harlow, Essex: Pearson Education Limited.

The Government Public Relations Department. (2023). Thailand ranks first in ASEAN for five consecutive years in SDG index. Foreign Office, The Government Public Relations Department. https://thailand.prd.go.th/en/content/category/detail/id/48/iid/192464

Wongsurawat, W. (2011). Management fees and total expenses of mutual funds in Thailand. *Journal of the Asia Pacific Economy, 16*(1), 15–28. https://doi.org/10.1080/13547860.2011.539398

Yan, X. and Su, X. (2009). *Linear Regression Analysis: Theory and Computing.* Hackensack, N.J.: World Scientific