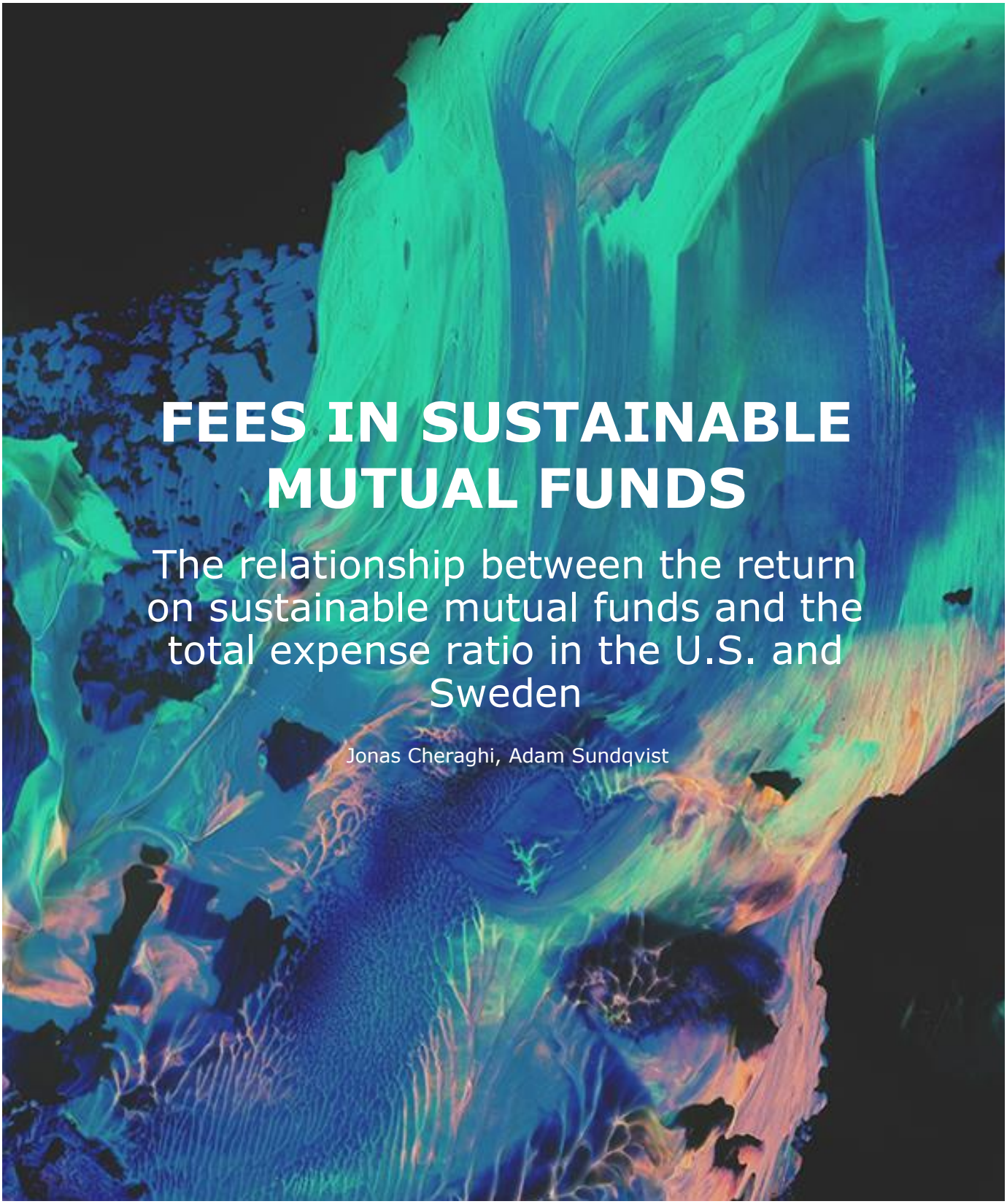
UMEÅ UNIVERSITY



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

Jonas Cheraghi, Adam Sundqvist

Department of Business Administration

Civilekonomprogrammet

Degree Project, 30 credits, Spring term 2022

Supervisor: Siarhei Manzhynski

[THIS PAGE WAS INTENTIONALLY LEFT BLANK]

Abstract

This thesis investigates the relationship between the total expense ratio and the 5-year performance to last month for sustainable mutual funds registered in Sweden and the United States. The increasing amount of mutual funds and the shift towards sustainability in the society gives cause to study the relationship between the total expense ratio and the performance of *sustainable* mutual funds rather than conventional mutual funds. The analysis was conducted by testing the relationships through different regression models for both the Swedish and the U.S. market. A simple regression model was conducted for both markets to study the relation that the total expense ratio has to the 5-year performance to last month. To further analyse the relation between the two variables, a multiple regression model was conducted for both markets to further analyse the significant relationship between the total expense ratio and the 5-year performance to last month. The data was collected via Eikon and included mutual funds registered in Sweden and the U.S., each mutual fund collected was retrieved together with an ESG score which was the definitive factor whether the mutual fund could be considered as *sustainable* or not.

The results gathered from the simple regression model for the Swedish market was found to have no significant relationship and the explanatory degree for the regression model was very low. The results regarding the simple regression model for the U.S. market are however found to be significant but with a low degree of explanation as well. Hence the result from this study indicates that there is no significant relationship between the total expense ratio and the 5-year performance to last month for the Swedish market when conducting a simple regression model, while the U.S. market has a low significant relationship between the variables. However, a multiple regression model for the Swedish market containing additional control variables presents a significant relationship between the total expense ratio and the 5-year performance to last month. The same results were found for the U.S. market when conducting a multiple regression model.

The results for the Swedish simple regression model align with previous studies conducted within this area, where previous studies have found there to be no significant relationship between the total expense ratio and the performance of mutual funds, hence same results are applicable to *sustainable* mutual funds. However, this study did in fact also display significant relationships for the multiple regression model for the Swedish market as well as for both regression models for the U.S. market. Which indicates that the total expense ratio to some extents have an explanatory relationship between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in both the Swedish market and the U.S. market.

Keywords: *Sustainable mutual funds, Mutual funds, Total expense ratio, Sustainable investing, Effective market hypothesis, Modern portfolio theory, Sharpe ratio, Tracking error, ESG, Management fee, EIKON, Sweden, USA*

[THIS PAGE WAS INTENTIONALLY LEFT BLANK]

Acknowledgements

We would like to take the opportunity to express our appreciation to our supervisor Siarhei Manzhynski for his valuable help and support that he has provided throughout the writing of this thesis.

Furthermore, we would like to thank our fellow students and teachers at the Umeå School of Business, Economics and Statistics for their support and feedback.

Finally, the two authors would like to thank each other for a good cooperation during the thesis and a great last semester at Umeå University.

Umeå, 17th of May 2022

Jonas Cheraghi & Adam Sundqvist

[THIS PAGE WAS INTENTIONALLY LEFT BLANK]

Table of content

1. Introduction 1
1.1 Background 1
1.2 Problematization 4
1.3 Purpose 7
1.4 Research question 7
1.5 Delimitations 7
1.6 Perspective of study 8
2. Theoretical frame of reference 9
2.1 Efficient market hypothesis (EMH) 9
2.2 Active & Passive management 10
2.2.1 Tracking error 10
2.3 Rational & Irrational investors 11
2.4 Modern portfolio theory 12
2.5 ESG 12
2.6 Social & Environmental sustainability 14
2.7 Survivorship bias 14
2.8 Theories & financial formulas 14
2.8.1 Risk-free rate 14
2.8.2 Capital Asset Pricing Model 14
2.8.3 Sharpe Ratio 15
2.9 Characteristics that affects mutual fund performance 15
2.9.1 Management fee 16
2.9.2 Fee & Performance 16
2.9.3 Total expense ratio 16
2.9.4 Years since registration of mutual fund 17
2.9.5 Asset under management (AUM) 17
2.9.6 Net asset value (NAV) 18
3. Methodology 19
3.1 Choice of subject 19
3.2 Pre-understanding 19

3.3 Scientific point of view 19
3.3.1 Ontology 20
3.3.2 Epistemology 20
3.4 Research approach 22
3.4.1 Deductive study 22
3.4.2 Quantitative study 22
3.5 Choice of literature 22
3.5.1 Source criticism 23
3.6 Method criticism 24
4. Practical methodology 25
4.1 Data collection 25
4.1.1 Currencies 27
4.2 Sample criteria of mutual funds 27
4.2.1 Increase – Sample selection 27
4.2.2 Mutual fund types 28
4.3 Financial metrics 28
4.3.1 Sharpe Ratio 28
4.3.2 Tracking error 28
4.3.3 Total expense ratio 29
4.4 Statistical hypothesis 29
4.5 Analysis of data 30
4.5.1 Simple & multiple linear regression 30
4.6 Multicollinearity 31
4.7 Standard deviation 31
4.8 Standard error 32
5. Empirical results & the linear regression model requirements 33
5.1 Model diagnostic 33
5.1.1 Linearity 33
5.1.2 Homoscedasticity 34
5.1.3 Normal distribution 34
5.1.4 Autocorrelation 34
5.2 Regression model 1 & 2 - U.S. market 34
5.2.1 Model 1 - Simple regression model 34

5.2.2 Result of hypothesis-test 35
5.2.3 Model 2 - Multiple regression model 38
5.2.4 Result of hypothesis-test 39
5.2.5 Model diagnostics multiple regression models U.S. market 39
5.3 Regression model 1 & 2 - Swedish market 44
5.3.1 Model 3 - Simple regression model 44
5.3.2 Results of hypothesis-test 45
5.3.2 Model diagnostic simple regression 45
5.3.3 Model 4 - Multiple regression model 48
5.3.4 Result of hypothesis-test 49
5.3.5 Model diagnostic multiple regression 49
5.4 The final regression models for the U.S. and Swedish market 54
6. Analysis & Discussion 55
6.1 Analysis of regression models 55
7. Conclusion & suggestions for future research 61
7.1 Conclusion 61
7.2 Truth criteria's 62
7.2.1 Validity 62
7.2.2 Reliability 63
7.2.3 Generalisability 64
7.3 Ethical & Social Principles 65
7.4 Theoretical & Practical implications 65
7.5 Future research 66
References 68
Appendix 1

List of tables

Table 1. Underlying categorical factors for ESG ratings 13
Table 2. Keywords used to find relevant articles 23
Table 3-6. Simple regression model testing the relationship between the total expense ratio and the 5-year performance to last month for the U.S. market 35
Table 7. Durbin-Watson test which is set to determine the independence of the model's residuals for the simple regression model based on the U.S. market 38
Table 8. 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 38
Table 9-11. Multiple regression model testing the relationship between the total expense ratio, tracking error, Sharpe ratio and the 5-year performance to last month for the U.S. market 38
Table 12. Shapiro-Wilk test which is set to determine the normal distribution assumption for the multiple and simple regression model based on the U.S. market 43
Table 13. Statistics VIF test which is set to determine if multicollinearity is present or not for the multiple regression model based on the U.S. market..... 43
Table 14. Durbin-Watson test which is set to determine the independence of the model's residuals for the multiple regression model based on the U.S. market 44
Table 15-18. Simple regression model testing the relationship between the total expense ratio and the 5-year performance to last month for the Swedish market..... 45
Table 19. Statistics VIF test which is set to determine if multicollinearity is present or not for the simple regression model based on the Swedish market..... 47
Table 20. Durbin-Watson test which is set to determine the independence of the model's residuals for the simple regression model based on the Swedish market..... 48
Table 21-23. Multiple regression model testing the relationship between the total expense ratio, the tracking error, the Sharpe ratio and the 5-year performance to last month for the Swedish market. 49
Table 24. Statistics VIF-test which is set to determine if multicollinearity is present or not for the multiple regression model for the Swedish market..... 51
Table 25. Shapiro-Wilk test which is set to determine the normal distribution assumption for the multiple and simple regression model based on the Swedish market 53
Table 26. Durbin-Watson test which is set to determine the independence of the multiple regression model based on the Swedish market..... 53

List of figures

Figure 1. Own replica of the deductive study process 22
Figure 2. Scatterplot which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the simple regression model based on the U.S. market. 36
Figure 3. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the simple regression model based on the U.S. market 37
Figure 4. Histogram which is set to determine the normal distribution regarding the residuals from the simple regression model based on the U.S. market 37
Figure 5. Scatterplot without 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 based on the U.S. market. 40
Figure 6. Scatterplot including 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 based on the U.S. market. 41
Figure 7. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model based on the U.S. market 42
Figure 8. Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model based on the U.S. market 42
Figure 9. Scatterplot which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the simple regression model for the Swedish market 46
Figure 10. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the simple regression model based on the Swedish market 46
Figure 11. Histogram which is set to determine the normal distribution regarding the residuals from the simple regression model based on the Swedish market 47
Figure 12. Scatterplot without 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 based on the Swedish market 50
Figure 13. Scatterplot without 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 based on the Swedish market. 51
Figure 14. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model based on the Swedish market 52

Figure 15. Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model based on the Swedish market 52

Concept definitions

Mutual funds: Mutual funds are professionally managed by fund managers and invest the assets acquired into securities such as stocks, bonds, and short-term debt, (Investor U.S. SEC, nd).

Equity funds: Equity mutual funds allocate their investments where the majority is placed into stocks, the purpose is to maximise and increase the potential return for the investor, in return for a higher risk (HSBC, nd; NE, 2022).

Index funds: Index funds allocate their investments into securities to match a benchmark, e.g., OMX30 Index or the S&P 500 Index, as close as possible, thus the majority of the index funds are allocated into equities that are in the index that it represents (Vanguard, nd; Morningstar 2020).

Sustainability: "For human society to survive over time it must operate sustainably, in a way that does not destroy or deplete these natural resources for future generations" (Lawrence & Weber, 2017).

ESG: Environmental, Social and Governance, it can be used as an indicator to how sustainable a certain investment is. The scores are calculated using different measurements of a company's activities related to its sustainability performance (Refinitiv, 2022).

Total Expense Ratio: Is a measurement to understand the costs paid by the investors, it includes the management fee as well as trading, legal, and auditory fees among others.

Sharpe ratio: Is used to describe how much excess return is received in comparison to the increased or added risk.

Tracking error: Is defined as the difference in volatility between the mutual funds return and its benchmark index and can be used to determine if a mutual fund's active or passively managed.

1. Introduction

The section below consists of background information regarding the general mutual funds market. Furthermore, the research gap is explained as well as the perspective of the study. The purpose of the study and its limitations is explained as well.

1.1 Background

Investing into mutual funds has become an increasingly popular form of saving. Mutual funds can be explained as a portfolio consisting of different shares which usually are chosen depending on what type of mutual funds it is (Investment company institute, n.d.). All mutual funds have a fund manager that manages the mutual funds, which shortly explained is to sell and buy shares to maximise the return in relation to what type of mutual fund it is, e.g., an index mutual fund which strives to achieve the same return as the benchmark it derives from. The mutual funds usually have a name which relates to what type of mutual funds it is, e.g., Swedbank Robur Access USA A, which is a mutual fund that invests into the US market and strives to be index close whilst saving into large and medium-large companies in the US (Swedbank, 2022).

In Sweden there are 786 active mutual funds (SCB, 2021) and over 80 % of the adult population has actively put parts of their savings into mutual funds (Swedish investment funds association, n.d.). In 2021 the net savings into mutual funds were registered to be around 195 billion SEK. This was the biggest amount of net savings in Sweden that has ever gone into mutual funds, recorded in a single year. The total Swedish mutual fund assets have increased steadily in the last 20 years, with the peak coming in 2021 where the amount was estimated to be 6 951 billion SEK. Of these 6 951 billion SEK, roughly 66% was placed within equity funds, which makes them the preferred saving option regarding mutual funds (Swedish investment fund association, 2021). The U.S. market has followed a similar path in recent years. The combined assets that were invested into U.S. mutual funds in December 2021 increased by $565,99 billion from November and amassed to a combined figure of $26.96 trillion in U.S. mutual funds (Investment company institute, 2022). The U.S. mutual fund market in 2020 consisted of 7636 mutual funds (Statista, 2021), by which equity mutual funds accounted for 53% of the total available mutual funds (Investment company institute, 2021). These patterns with increasing investments into regulated mutual funds can be seen throughout the global market where the net asset flows have been increasing in Europe, North America and the Asia-pacific region between the end of 2019 and the year 2020 (Investment company institute, 2021, p.21).

The increase in mutual fund investing can be attributed to a variety of factors. One factor is that the mutual funds expense ratios have been on a downwards trend in the recent 30 years. This trend can be attributed to increased competition from additional mutual funds in different markets, as well as economies of scale which has occurred due to the large influx of capital in the sector (Investment company institute, 2021, p.135). This overall trend has led mutual funds to become an appealing savings alternative. Another possible factor for the increased net fund inflows could be attributed to the overall movement towards more passive investing. Where investors seek to invest their money into index funds and mutual funds managed by professionals. The main portion of the funds has gone into index funds and actively managed funds with a low expense ratio. This trend

showcases a reality where investors seek and appreciate simplicity in their investment decisions (Shilling, 2019).

The positive trends around the investment in mutual funds can also be seen concerning the general interest regarding sustainable investing where the interest for this type of investments has increased (Hartzmark & Sussman, 2019, p. 2832). It has become apparent that investors prefer certified sustainable investments, and, in some cases, they are even willing to sacrifice an increased risk to choose the sustainable alternative (Gutsche & Ziegler, 2019). Environmental, Social & Governance (ESG) factors have become one of the most important aspects in sustainable investing (Deloitte, n.d.). The ESG factors incorporate a wide range of matters, but they generally focus on human rights, climate change and diversity (Investment company institute, 2021, p.60). Sustainable investments are based upon ESG analytical performances in relation to companies that take social and sustainable responsibility (Morningstar, 2018). Sustainable mutual funds, in comparison with regular mutual funds, actively work to ensure that the securities behind the mutual fund take sustainability into account as well as their work on the environment, social responsibility and corporate governance aspects (Pensionsmyndigheten, 2021).

When buying shares and investing into mutual funds in general, investors have the possibility to impact the companies they invest into, as the investment decisions can alter the share prices and in return the funding's of the companies (Kölbel et al., 2020). Furthermore, the investors have an impact on the company's social and environmental parameters as investors can decide to invest solely into these companies and move focus away from traditional mutual funds (Kölbel et al., 2020). Thus, investors whose decisions are based upon fundamental values regarding environmental, social and governance responsibilities can as an individual, and as an investor create an impact towards the companies they invest in through a sustainable mutual fund, (Kölbel et al., 2020). With this said, the takeaway point is that if investors are willing to act sustainable, they can do so by investing solely into sustainable mutual funds/companies. If the majority turns towards sustainable investment options, then traditional mutual funds might have to shift their investment strategies to sustainable options in order to attract new investors.

To be classified as a sustainable mutual fund, there are several different criteria's to be met depending on the domicile the mutual funds are registered in. In the United States, the most prevalent rating system is the "MSCI ESG Fund Ratings". The purpose of the ESG fund ratings is to "measure the resilience of mutual funds and ETFs to long term risks and opportunities arising from ESG issues" (MSCI, n.d.). These ratings provide transparency and create a better foundation of understanding for investors in regard to ESG risks. The rating system consists of a scale between AAA and CCC, where a rating of AAA means that the fund is a market leader in relation to owning/being exposed to companies with a strong management of financially relevant ESG issues. The companies in these higher rating columns may also be more resilient to ESG related external disruptions (MSCI, n.d.). There are also individual national sustainability classifications that can be used to evaluate the dimensions of sustainability in mutual funds. In Sweden, one of these classifications is called "Svanenmärkningen". In regards to ESG investing there are different approaches, these are *exclusionary investing,* where the focus is on excluding certain industries and companies that do not meet certain ESG criteria's, *inclusionary investing,* where the focus is on creating a portfolio based on both traditional financial analysis and ESG factors, and *impact investing,* where the strategy is to create a positive and measurable social and environmental impact alongside an economic return

(Investment company institute, 2021, p.61). These approaches are integrated in the "Svanenmärkning" classification where companies can be excluded based on their business operations (selling tobacco, weapons and using fossil fuels etc.), but companies can also be included on other basis than just financial performance, for example by operating in a sustainable industry and being subject to, and passing ESG-analysis (Svanen, 2022). Thus, in this study when referring to sustainable mutual funds, the reader can be assured that these have been labelled after the required criteria's are met. In this study Refinitiv (2022) will be used in order to collect and label sustainable mutual funds.

The costs of managing a mutual fund, such as the operating, analytic, legal, custodial, and administrative all add up to the management fee, which is paid by the investor, (Investor, U.S. SEC, n.d.). It is important to understand that there are several other costs that are not included in the management fee, costs such as transaction cost, brokerage fee, exchange fees, purchase fees and result based fees which are also paid by the investor, (FINRA, nd; Swedbank, n.d.). Total Expense Ratio (TER) is a measurement to understand the costs paid by the investors, it includes the management fee as well as trading, legal, and auditory fees, this measurement will be used in this study to understand the costs regarding mutual funds in the US market. Unfortunately, there is no equal benchmark between the US market and the Swedish market, in regard to management fees. The management fees regarding mutual funds are fixed and based on a yearly percentage, although the fee is calculated daily by dividing the management fee with the number of days per year, which would be 365. This is done to receive the daily management fee, which is withdrawn from the daily NAV.

When overseeing and comparing two different financial markets it is of relevance to the study that the financial markets are evaluated to determine the state of the economy and build a foundation of understanding that will affect the conclusions drawn later in the study. The US and Swedish economic policies are different in certain aspects, but also very similar to the underlying principles of the business systems. Some of these basic principles include: freedom of choice, private property rights, profit motives of owners & owner control (U.S. Dep. Of Treasury, n.d.; Regeringen, n.d.). The Swedish economy has rebounded after the economic decline that followed with the coronavirus in the beginning of 2020. In 2021 the Swedish economy continued its recovery with a growth in GDP from the second to third quarter at about two percent. The Swedish national bank (Riksbanken) has kept the repo rate at 0,00 percent in recent years, which could be argued as an indicator of expected continued growth and stability in the coming months/years (Riksbanken, 2022). However, it is also stated that the uncertainty regarding different variants of the coronavirus and possible future restrictions could lead to changes in the positive economic forecasts (Konjukturinstitutet, 2021, p.5).

The US economy has followed a similar pattern with a distinct economic recovery since the middle of 2020. But in the same manner as the Swedish economy, the economic growth in the US has been hampered in recent times by an increase in infections related to different variants of the coronavirus. The US has also been negatively affected by bottlenecks in production due to shortages linked to previous lockdowns. This in combination with increased energy prices has led to a surging inflation that has increased living costs for the population. However, the federal reserve has, like their Swedish counterpart Riksbanken, left their policy rate unchanged. This should indicate that the US market will continue to be stimulated by monetary policies and have growth ahead of it (Konjukturinstitutet, 2021, p.6-7).

Based on these observations it can be concluded that, from an economic point of view, the two financial markets are being run in a similar fashion in turns of economic policies after the recession in 2020 that can be derived from the coronavirus pandemic. The overall economic policies are different in many ways, but as the basic principles regarding the capital market and the economic simulation packages following the pandemic are similar in many ways, the comparisons between the two markets can be relevant and of great interest to answer the proposed research question. As both markets are derived from the same economic conditions, any eventual abnormal returns will not be due to any external economical differences in the two different markets. Furthermore, as both markets have similar economic conditions it will benefit the thesis, as the general conclusions and discussions in this study will be comparable due to its similarities in the different markets.

1.2 Problematization

Regarding the performance of sustainable mutual funds in comparison to conventional funds, the subject has been extensively covered with the consensus being that investing in mutual funds with a focus on sustainability and a portfolio of high ESG-rated companies generates a higher return on the investment (Gil-Bazo et al., 2010; Vidal, et al., 2015). Previous research on this subject has concluded that there is no relation between investing in SRI (socially responsible investing) mutual funds and receiving a negative return, in comparison to investing in conventional funds (Gil-Bazo, Verdú & Santos, 2010; Vidal, Vidal-Garcia, Lean & Uddin, 2015). On the contrary, it has been shown that mutual funds investing in high ESG-rated securities yield a higher rate of return (Basile & Ferrari, 2021). This indicates that investing in mutual funds with a focus on sustainability would not be considered a sacrifice in terms of return on investment.

Another research study by (Burton, 2013), has studied the relation between the total expense ratio and the return from mutual funds, specifically, actively managed mutual funds and passively managed mutual funds, and the conclusion was that no relation between these two parameters were found. The study found that passively managed mutual funds outperform actively managed mutual funds and could draw the conclusion that a higher management fee does not correlate to a higher return as the fee regarding actively managed mutual funds is higher in relation to passively managed mutual funds (Burton, 2013). This is not the only study to come to this conclusion. Other studies (Garmhausen, 2011; Tandon & Singh, 2021) have also found there to be no significant relation between expense ratio and mutual fund performance. This indicates that regarding conventional mutual funds there is no advantage to pay a higher management fee as it would not reciprocate the investors with a higher return on their investment.

It has previously been mentioned that earlier research regarding this subject have found different conclusions, such as Burton (2013) that found no relationship between the total return of a sustainable mutual fund and the total expense ratio. This study will focus on two different markets, the U.S., and the Swedish market, many of the earlier research regarding this subject have examined the U.S. market while there are only a few studies that consist of samples outside of the United States. One study conducted by Ferreira et al., (2013) studied mutual funds using samples from 27 different countries, in which the study concluded that there is a negative relationship between the total expense ratio and the mutual funds' performance. Furthermore, there have been studies conducted with samples specifically from Europe, where Otten & Bams (2002) studied the relationship between the performance of mutual funds and their characteristics, it was no surprise that

this study found results that agreed with previous studies where there was a negative relationship between the total expense ratio and the risk-adjusted performance of mutual funds. Furthermore, the previous research within this area has barely covered the Swedish market, one article however has touched this subject which is Dahlquist et al., (2002) who has studied the relation between fees and performance in Swedish market with contemporary results as previous studies which shows a negative relation between the variables.

In short there have been several studies conducted within this area, most studies have presented results that are equivalent with each other, hence, in relation to this it can be concluded that there is a general negative relationship between the total expense ratio and the total return of mutual funds.

As mentioned above it is an ongoing discussion whether a higher fee is justifiable in return for a greater yield on an individual's investments. Previous research has concluded that actively managed mutual funds with a higher expense ratio in comparison with index funds with a lower expense ratio do not outperform the latter considering its return over time as well as its expense ratio (Gruber, 1996; Garmhausen, 2011; Singh & Tandon, 2021). Based on this consensus it would be interesting to answer how the relation between sustainable mutual funds and the expense ratio are in two different markets, in part because of the opportunity to be able to draw generalised conclusions over different markets. But furthermore, to create an understanding if there is a difference for an investor to invest in sustainable mutual funds in different markets and if the fees in relation to the return has the same relation in both markets.

Swedbank conducted a study in 2021 where the results were contemporary with the idea of the increasing interest regarding sustainable saving alternatives, 8/10 answered that they indeed do consider investing in sustainable forms of investments. We can compare these results to the results conducted in 2017 where the answers were that 7/10 considered investing in sustainable alternatives, thus the interest, considering the general investor, has steadily increased during the past years (Swedbank 2021). Previous research has confirmed the fact that investors do indeed value sustainability, the inflow to high sustainable mutual funds in comparison to low sustainable mutual funds more than doubled in 2018/19 which according to the authors points towards the market perceives sustainability as a positive attribute (Hartzmark and Sussman, 2019, p. 2832).

Based on the previously conducted research regarding the relation between management fees and performance of mutual funds, as well as the general research regarding the performance of sustainable mutual funds, it is intriguing to investigate if there is a relation between the level of expense ratio and the performance of sustainable mutual funds. There is a research gap regarding the relation between the total expense ratio and the overall performance of sustainable mutual funds, as explained earlier, previous research has been limited to only study general mutual funds and there have been no studies conducted that compared the Swedish market to the U.S. market. This study has closely read through previous research and has understood that the consensus from previous research is that a higher management fee does not correlate to a higher return (Burton, 2013).

Considering today's economic landscape and the world in general, the most important challenge the world faces today is specifically *sustainability* (Liew et al., 2014). The rapidly evolving regulatory and economic landscape in relation to the importance of

assessing risks regarding climate changes does make it interesting to specifically study *sustainable mutual funds* rather than *conventional mutual funds.* Due to the above, (Zimmermann, 2019) argues that one major participant who holds great influence to face the challenges around *sustainability* due to its influence regarding the industrial environment in general is financial markets. As the financial market has taken this into consideration and thus implemented *sustainable mutual funds* which are available as options towards the investors to invest within, it is interesting to study the relation between the financial performance of these *sustainable mutual funds* and their *total expense ratio.*

The reason why the Swedish market as well as the U.S. market was chosen to study in this thesis is partly due to there being a research gap within this research area as there has been no studies regarding the Swedish market. Additionally (Ziolo et al., 2019) presents results that the Scandinavian market in comparison to other countries within the European Union faces other qualifications considering the economic growth and the sustainability focus within Scandinavia. Hence, it is highly interesting to further study a country within Scandinavia, in this case due to the above the choice fell on Sweden. Sweden and Swedish companies in general are considered as highly rated regarding sustainability and ESG. Furthermore, as Sweden is a member of the European Union as well as the United Nations it could be argued that there is an incentive that Sweden is a member due to these unions being considered as leading figures regarding sustainability. As Sweden is a member of the European Union the country is subject to follow regulations set by the EU such as the MiFID II which serves as a protection from advisors due to its transparency towards clients. In later stages the regulations from MiFID II have been further developed and included several sustainability changes to the financial markets within the EU. Hence, due to the intelligence gathered it can be concluded that Sweden does indeed have a great focus towards sustainability, as this study aims to study specifically *sustainable mutual funds,* Sweden is a great market to study.

Furthermore, it would be interesting to study the U.S. market in comparison with the Swedish market due to the U.S. being a large market considered as the frontrunner in the financial markets. Furthermore, it has been concluded that the U.S. financial market has increased the flow of money managed by fund managers and other professional managers considering SRI investments, with a continuous growth since 2005 where it grew with 12% (Bauer et al., 2005). With an increased interest regarding sustainable investments considering both markets chosen it makes sense to study these and compare the markets to see if there are any differences regarding the *financial performance* to the *total expense ratio*. However, the U.S. comparing the U.S. rating to the Swedish ranking, they do not align with each other, Sweden can be noticed as front runners, while the U.S. are slipping behind (SGDindex, 2021).

Hence, with the above taken into consideration it is both highly topical as well as highly interesting to study the relation between the total expense ratio and *sustainable mutual funds* to present the results to investors as well as managers of *sustainable mutual funds*. These stakeholders will thus be able to understand if there is a relation between the price of *sustainable mutual funds* in the different markets and hence make their own investment decisions based on this theses results.

Regarding the choice of mutual funds markets/domicile, this study found it interesting to compare the sustainable mutual funds based in Sweden and the US on the basis of results

presented in previous studies. Both domiciles have a similar theoretical background in terms of having previous studies that supports the notion that having a socially responsible focus on your investments do not have a negative impact on your return (Soler-Dominguez et al.,2020; Gil-Bazo et. al., 2010; Vidal, Vidal-Garcia, Lean & Uddin, 2015). On this basis a fair comparison could be drawn between the markets in turns from a theoretical standpoint. In terms of overall sustainability focus between the countries, Sweden is at the top of the metrics with the United States falling several steps behind on the rankings, but still in a favorable position in terms of comparison with other countries (SDGindex, 2021). As mentioned previously, there is a research gap in the theory regarding the relationship between the total expense ratio and the financial return on sustainable mutual funds. By looking at the Swedish and the U.S. domiciles, this study believes it would be interesting to see if there is a difference in the sustainable mutual fund return in relation to the sustainable mutual funds total expense ratio between the two domiciles. Based on their similar theoretical background, different sustainable policies, geographical location, and market size the study finds it interesting to see if these external factors have an impact on the relationship between total expense ratio and the financial return of the sustainable mutual funds.

1.3 Purpose

This study aims to investigate and further study the relation between management fees and the return of sustainable mutual funds. The study will analyse sustainable mutual funds from the Swedish market and the US market, the aim is to answer the hypothesis as well as to explore the relation between management fees and the returns of sustainable mutual funds. The study aims to understand whether investors will increase their profits by investing into sustainable mutual funds with a higher management fee.

1.4 Research question

Is there a relation between the return on sustainable mutual funds and the total expense ratio within the US market and the Swedish market?

1.5 Delimitations

This study will sample data from Swedish domiciled mutual funds as well as U.S. domiciled mutual funds, these two markets have been chosen based on previous research within this area where a gap has been found where these two domiciles have not yet been studied in comparison with each other. Furthermore, to further study the established gap, this study will grasp *sustainable mutual funds* from these two markets, an ESG score from EIKON (Refinitiv, 2022) will define what will be referred as a sustainable mutual fund in this study. The two markets chosen are also accessible for foreign investors, which opens for a relevancy for other countries as well. This study will only study sustainable mutual funds which are active from the day that the actual collection of data occurs, in which any mutual funds that are not active by that day will be excluded. Furthermore, this study will use domicile as a criterion to collect data, hence, there will be mutual funds that are considered as Swedish or U.S. mutual funds but are not registered in respective countries and will hence not be part of the data sample. Hence, when this study refers to each domicile it will do so by referring the domiciles as markets in the text. Only mutual funds registered in the United States and in Sweden will be used for this study.

The limitation regarding the selection basis of sustainable funds will be based on the ESG-rating from the database Thomson Reuters Eikon (Refinitiv, 2022). The criteria for selection will be an ESG-rating of ≥ 50. According to Refinitiv (2022) an ESG rating

above 75 is considered as a great example of a sustainable mutual fund, however, for this study to have a sample criterion which is normally distributed the ESG criteria has been lowered to ≥50 to collect a larger data sample. Although, it must be mentioned that the rating system from Refinitiv (2022) still considers mutual funds with an ESG score of 50 and above as a *good* value and hence it can be deemed as a *sustainable mutual fund* with this score as well.

As the Swedish market and the U.S. market uses different fees for their mutual funds it has been decided to use *total expense ratio* instead of management fees. This has been done as the total expense ratio can be applied to both markets and it includes management fees as well as other fees that are relevant when purchasing a sustainable mutual fund as a private investor.

1.6 Perspective of study

The design of this study is done through the perspective of a private investor, the study aims to present results for private investors to use as guidance when investing into sustainable mutual funds. Furthermore, the results from this study are to be presented to the target group for private investors to comprehend whether a higher total expense ratio will return a greater performance for sustainable mutual funds.

2. Theoretical frame of reference

The theories explained under this section are the theories that will be used to conduct this study. The theories have been based upon earlier research and have been selected as they are relevant for the selected thesis. They will be used to explain mutual funds, general ideas behind the stock market as well as other general points that are needed for the study to be executed.

2.1 Efficient market hypothesis (EMH)

Efficient market hypothesis is one theory that explains how different markets vary in strength, this theory was published in The Journal of Finance under the name "Efficient capital markets: A review of theory and empirical work" in 1970 by the author Euguene F. Fama. In general, an efficient market arises when the stock price reflects all available information, the theory claims that there are three different types of strengths: weak market, semi-strong market and strong market (Fama, 1970, p.383). A weak formed market suggests that the stock price is reflected upon past and historical stock prices, movements and information, a weak market efficiency suggests that there is no possibility of making any type of gain by studying old and historical data regarding a specific stock (Fama, 1970, p.389). A semi-strong market however suggests that the share price is reflected upon all publicly available information, even at this efficiency there are no possibilities for any gains considering the share price reflects the public information available. Finally, there is the strong market efficiency, at this stage the theory suggests that the stock price reflects all public and private information available, thus at this stage there is no possible way to make any type of gains in relation to expected normal return of the market (Fama, 1970, p.414-416). In general, the market efficiency suggests that no investor has the possibility to outperform the market as, according to the theory, the share prices on the market are neither overvalued nor undervalued (Fama, 1970). So according to this theory, there is no possible way for any sustainable mutual fund to outperform the stock market over a long period of time.

A central part of the efficient market theory is based upon the *random walk theory* in which the theory states that share prices are random and are not predictable (Bodie et. al., 2011, p.372). Furthermore, it can be said that the general idea behind *passive management* concerning mutual funds is based upon the efficient market theory (Hård af Segerstad & Pettersson, 2016). As this theory states that all available information is already incorporated into the share prices, hence there is no possible way to acquire a gain by recognizing any overvalued or undervalued stocks (Hård af Segerstad & Pettersson, 2016, p.11). Hence, according to the EMH actively managed mutual funds should have a hard time to manage to outperform the market, which is also proven to be correct, furthermore, *actively managed* mutual funds are relatively more expensive than *passively managed* mutual funds (Jones & Wermers, 2011, p.30-31). According to Jones & Wermers (2011, p.31) investors prefer to invest into passively managed mutual funds when the market is semi-strong, as passively managed mutual funds tend to perform better than actively managed funds for a lower fee. Thus, according to EMH and present theories, an efficient market does not justify actively managed funds to extract larger fees in relation to the fees taken by passively managed mutual funds. This study however will grasp to study if there is a difference regarding sustainable mutual funds and if it is justified to extract a larger fee and whether a larger fee does return a higher performance.

This theory is considered during the thesis as the EMH general idea is that the share prices are random, and that all available information are incorporated into the share prices.

However, the assumptions in the EMH states that no investor have the possibility to outperform the market and hence it cannot be justified by *actively* managed sustainable mutual funds to take a higher total expense ratio as there is not possible to outperform the market. Due to this, the study must assume whether EMH is present or to assume that EMH is not present and move forward based on that understanding. This thesis has assumed that EMH is not present, in connection to the mutual fund market to justify the differences in total expense ratio. As without that assumption the thesis question would be irrelevant.

2.2 Active & Passive management

Passive management can be defined as fund managers purchasing securities to reflect a benchmark, such as the OMX30 or the S&P 500, to do this, the fund managers are obliged to buy certain securities for the fund to mirror the benchmark. Active management on the other hand must frequently buy and sell securities as it seeks to outperform index, however this is rarely the case (Jensen, 1968). As the majority of previous studies have shown, passive management does outperform active management, one theory behind this is due to the fact of an efficient market theory as well as the random walk (Malkiel, 2003). Thus, the prices of securities are unpredictable and should according to the theory reflect all the available information on the market (Malkiel, 2003). There have been several studies made regarding the relation between active management and passive management, a study consisting of data samples from 1945-1964 found that active managed funds not only failed to add value but also tended to underperform the market "by approximately the amount of their added expenses" (Jensen, 1968). Sharpe (1991) suggests that according to the laws of arithmetic there are two principles that must be true regarding the relation between passive and active management; "(1) before costs, the return on the average actively managed dollar will equal the return on the average passively dollar and (2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar". The principles from Sharpe (1991) and the study from Fama & French (2010) concludes that the high costs combined with active management makes it unachievable for active managed funds to outperform the market e.g., outperforming index funds. Although not every study conducted agrees with the above, some studies have found that active management would seem to outperform passive management during a bear market, and in contrast, during bull markets, passive investors come out as winners (Sorensen et. al., 1998).

Active & Passive management is taken into consideration when conducting this study as these two types of management must be taken into consideration when collecting the data and analysing the regression models. When analysing the collected data and the relation to the total expense ratio, the management of the mutual fund type must be taken into consideration. This is since the total expense ratio generally is lower for passively managed sustainable mutual funds than it is for actively managed sustainable mutual funds. Hence, the value of the total expense ratio can to some extent be allot to the management of the sustainable mutual funds, e.g., if it is actively or passively managed.

2.2.1 Tracking error

Furthermore, to determine whether a mutual fund in general is actively managed or passively managed the *tracking error volatility* can be used (Cremers & Petajisto, 2009, p.3330). The tracking error is defined as the difference in volatility between the mutual funds return and its benchmark index (Rasmussen, 2003). Depending on how much the value calculated from the tracking error differs from the mutual funds benchmark index

it can explain the management for the mutual funds (Cremers & Petajisto, 2009). Thus, the result from the calculation of the tracking error can explain the management of a mutual fund, a sustainable mutual fund considered as passively managed as it follows its benchmark should have a tracking error close to 0% (Rasmussen, 2003). In short, the tracking error explains how much risk a sustainable mutual fund manager takes, in general the tracking error is larger for active managed sustainable mutual funds in relation to passively managed sustainable mutual funds (Cremers & Petajisto, 2009).

$$\sqrt{\sum_{i=1}^{n} \frac{(R_b - R_p)^2}{N-1}}$$

Equation 1: Formula for tracking error, source: Cremers & Petajisto, 2009.

R_b = Return of sustainable mutual fund
R_p = Return of benchmark index
N = Number of periods

2.3 Rational & Irrational investors

The topic of rational and irrational investors has been discussed throughout many scientific papers and debates. The two sides debate whether the overall investors act rationally or irrationally in the stock market. On the one side there are people who base their thoughts on the concept of EMH (effective market hypothesis) beginning with the article "The behavior of stock market prices: I. Introduction". The article argues that investors act rationally in the market and the prices of stocks and funds are based on the latest available information (Fama, 1965). On the other hand, there have been subsequent studies which have shown the opposite, which is that investors on the market act irrational and make perceived irrational decisions based on the factual understanding of the situation (Mamun et al., 2015). The consensus over the recent years is that no perfect market exists and that investors act irrationally independent of the information they possess. This notion is further supported by the fact that one of the pioneers of EMH (Fama, 1965) has in later studies admitted that a perfect market does not exist (Fama, 1993; Mamun et al., 2015). The notion that investor behavior can be calculated based on psychological behavior is also perceived to be flawed as there has been no standard model that seems to accurately predict future market movements. To create a greater understanding of investor behavior a combination of the EMH theory and psychological aspects should be taken into consideration (Mamun et al., 2015).

Based on the assumptions above regarding investors rationality, the authors have based the thesis on the assumption that investors in some sense act irrationally. This could be due to underlying psychological factors or specific practices that influence cash flow and fund value (Elton et al., 2004, p.285). Based on the studies above it can be assumed investors act irrationally on both the fund and stock market. Which adds to the relevancy of the study.

2.4 Modern portfolio theory

Modern portfolio theory is one of the main staples in economic theory and was published in the article “Portfolio Selection” in 1952 by the author Harry Markowitz. It has since then been worked upon throughout the 1960 & 1970s to develop into the theoretical definition we have today. The basis of the theory is that investors should strive towards maximising discounted expected/anticipated risk-adjusted returns, as well as desire expected returns while viewing a variance of returns as something to be considered undesirable (Markowitz, 1952, p.77). A central theme in order to achieve the maximised risk-adjusted return in relation to the modern portfolio theory is diversification. Markowitz argued that to get the best risk-adjusted return an investor should choose a diverse portfolio with an acceptable risk level depending on the individual's risk preference. Risk-adjusted return can be described as the calculation of potential profit with the agreeable degree of risk that has to be taken to achieve it (Markowitz, 1952, p.77-78).

In relation to the basis of the theory regarding maximizing expected returns, there is a rule that suggests that an investor should diversify their investments into securities that give the highest expected return. Given the law of high numbers, this strategy would mean that the actual yield of the portfolio would be similar to the expected yield. Markowitz found the expected returns rule to be inadequate because the law of high numbers could not be applied to a portfolio. This was because of the fact that the returns from securities were too intercorrelated and diversification could not eliminate all variance in the portfolio. This indicated that a portfolio with the focus on highest expected return is not synonymous with having the least amount of variance. Instead, there is a relation between taking on variance and increasing your expected returns, and on the other hand reducing your variance and in turn reducing your expected returns (Markowitz, 1952, p.79). After rejecting the expected return rule, Markowitz mentions a different rule called the “E-V rule” which implies that an investor should choose a portfolio with the highest expected return based on their inclination for variance (Markowitz, 1952, p.89). The “E-V rule” implies that diversification is something to strive towards, but it specifies how to diversify the portfolio. Diversification is not advantageous if it is only based on the number of securities the portfolio consists of. It is paramount that the securities have a low covariance among themselves based on industry and national markets. A high covariance among the securities could lower the variance, increase the risk and lead to lower returns because the securities in that case often follow a similar development (Markowitz, 1952, p.89).

The general idea behind the modern portfolio theory is that diversification leads to a higher degree of return. This is relevant in this study due to the comparisons between different markets. The theory is considered when conducting this study as sustainable mutual funds invest into many companies to diversify the risk and the allocation of funds. As the data collection consists of many sustainable mutual funds it must be addressed that the diversification of companies that funds are allocated into can vary heavily between the sustainable mutual funds and hence addressing the issue to the differences in return.

2.5 ESG

ESG can be described as a concept that covers sustainability from different categories. In a business context ESG revolves around a sustainable business plan and risk management in relation to minimising potential negative effects of the company's products and services (Nordea, 2021). In recent years the demand for a more sustainable approach to investment

has made ESG-factors play a bigger role when it comes to investment decisions for all types of investors. This has led to an increased focus on ESG-factors in relation to both the management of professional portfolios as well as individual investors' portfolios (Liesen et al., 2013, p.175).

ESG-scores can be calculated using a variety of methods. Usually the ESG-score is calculated using different measurements of a company's activities related to its sustainability performance. These measurements of different categories are then given a score, which in summary with all other measured categories generates an ESG-score for the company. The three main categories that ESG consists of is; *Environmental, Social & Governance* (Refinitiv, 2022, p.6).

The *environmental* category usually consists of a measurement of a company's resource use, their combined emission pollution, and their innovative approach to sustainability. The *social* category consists of the companies' attitude towards their workforce, human rights, community as well as their accountability towards their products and its effects on consumers and stakeholders (Refinitiv, 2021, p.6).

The *governance* category consists of how the company handles their commitment towards corporate governance laws, their strive towards equal treatment of all shareholders and their active communications of how they integrate ESG-factors in their daily operations (Refinitiv, 2021, p.6,22).

The grading formula is based on a A-D grading system, where an A grading symbolises good adherence to the ESG-criterias as well as excellent transparency regarding related ESG material. The D grading on the other hand symbolises poor ESG performance and little or insufficient transparency regarding ESG matters (Refinitiv, 2021, p.7).

Table 1. Own replica of underlying categorical factors for ESG ratings

Environmental	**Social**	**Governance**
Resource use -Natural capital -Deforestation	Workforce -Labour standards -Health and safety conditions	Management -Boards diversity and structure
Emissions -Waste and pollution -Gas emissions	Human rights	Stakeholders -Political lobbying and donations
Innovation -Renewable energy -Climate change	Community	Corporate social responsibility (CSR) strategy -Business ethics and fraud management
	Product responsibility	

Source: Eikon (Refinitiv, 2022)

2.6 Social & Environmental sustainability

Social sustainability is according to the United Nations all about identifying and dealing with the affect companies have on humans (United Nations, nd). Furthermore, as well as its relationship with stakeholders, which in this case applies to customers, employees, and overall society's where these companies operate within. There are several different types of social sustainability which companies have to deal with, Elkington (1997, p.79) name a few of this as child labour and slavery, however he still mentions that although these problems arise, humans rather put their focus towards environmental sustainability. Environmental sustainability, hence, are problems such as natural capital where the earth is somehow damaged or changed for the worse (Elkington, 1997). As Costanza & Daly (1992, p.38) describes there are two different types of natural capital, these being *renewable capital* and *non-renewable capital*, and these two groups are a major part when assessing the value of natural capital which is important to determine the optimal resource extraction.

2.7 Survivorship bias

Survivorship bias is something that needs to be considered when it comes to data collection regarding the performance of mutual funds. This is especially important when dealing with a portfolio of mutual funds, where the remaining funds in the portfolio are usually the ones which have performed well and generated a high return (Rohleder et al., 2010, p.441). In many cases the mutual funds who perform poorly are not discontinued, but instead they are merged into another fund that is managed by the same sponsoring organisation. The consequences of these actions are that the poor performing funds are deleted from the sponsoring organisations record, while at the same time, the organisation continues to collect fees from the investors due to the merger (Elton et al., 1996, p.1098). If survivorship bias is not taken into consideration the performance of the portfolio can be overestimated and lead to misleading conclusions regarding the overall performance of the portfolio and subsequently the competence of the managing organisation/fund manager (Rohleder et al., 2010, p.441).

2.8 Theories & financial formulas

Below are relevant theories & financial formulas that are necessary for this study to be conducted. Some of these theories & financial equations are used in order for the regression models to be conducted, these are further explained in the practical methodology section of this study.

2.8.1 Risk-free rate

The risk-free rate is used in many of the theories used in this thesis, there are several different rates to be used as the *risk-free rate.* Since this study will compare the Swedish market against the U.S. market it could use both the U.S. Treasury bill as well as the Swedish STIBOR. Hence, for each variable where the risk-free rate is used it is based upon each market's respective risk-free rate, *U.S. 10y treasury bill* and the *STIBOR.*

2.8.2 Capital Asset Pricing Model

CAPM is used as a tool to predict and measure the relation between an investment's systematic risk and the expected return of that same investment, the theory was founded and developed in the 60s by Sharpe, Treynor, Lintner and Mossin (Fama & French, 2004, p.25). The formula for CAPM is the following (Fama & French, 2004):

$$ERi = Rf + \beta i\ (ERm - Rf)$$

Equation (2) states that *ERi* is the expected return concerning asset "*i*", *Rf is* the risk-free rate, βi is the Beta for the asset *"i"* and finally the ($ERm - Rf$) is the market risk premium.

The Beta-value is central in CAPM as it measures the risk premium of a specific stock and depending what value the Beta has the risk premium changes (Sharpe, 1964). A Beta at 1 would insist that the systematic risk for the security is the same as for the market, as the market has a Beta of 1. Thus, a Beta over 1 would assume that the systematic risk is larger than the market and a Beta under 1 would assume that the systematic risk is less than the market (Berk & DeMarzo, 2019). Since the theory of CAPM was introduced, it has been further developed with new theories that expands upon CAPM due to its inefficiency and limitations (Fama & French, 1993). Theories such as the *Fama & French 3 model theory* and *Carhart 4-factor model* have been developed from CAPM, these theories have included new additional factors to further explain the CAPM and will be explained further in this thesis.

2.8.3 Sharpe Ratio

Sharpe ratio is a well-known theory which was developed and founded by Sharpe in 1966, the Sharpe ratio is used as a tool to measure the expected return per unit of risk, and it is derived from the CAPM equation (Sharpe, 1994). Simplified, the Sharpe ratio is used to describe how much excess return is received in comparison to the increased or added risk (volatility) for holding a riskier asset (Sharpe, 1966). Thus, by theory, an individual should seek to own a portfolio with the highest Sharpe ratio as it will be the most efficient as a higher Sharpe ratio would see the return to be increased in relation to the risk taken (Sharpe, 1994; Berk & DeMarzo, 2019).

$$R\,\frac{R_p - R_f}{\sigma p}$$

The Sharpe Ratio Equation (Sharpe, 1994)

Whereas in this equation R_p is the return for the portfolio (expected return for asset p), R_f is the risk-free rate σp would be the StDev (standard deviation) for the asset over a given period of time (Bednarek et al., 2016). The measurement has all the basis to compare 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). However, the deficiency with the theory is the fact that it assumes that the assets return distribution is stable overtime, which is no guarantee (Bednarek et al., 2016). Thus, it is highly important to take this into consideration.

2.9 Characteristics that affects mutual fund performance

The characteristics below are factors that previous research have found to have significant relation regarding the performance of mutual funds. These characteristics can be discussed as additional factors to understand and further explain the performance of the selected sustainable mutual funds in this study.

2.9.1 Management fee

The general way that mutual fund management companies get paid is through management fees. The management fee is used to compensate fund managers for their work and is usually determined on the basis of covering both administrative expenses as well as the cost of expertise when it comes to actively managing the mutual funds' assets. The administrative activities can consist of accounting, regulatory finding, and statement processing among other similar activities (Korkeamaki & Smythe, 2004, p. 418). Beside the traditional management fee where a fixed percentage fee is based on the underlying invested assets in the mutual fund, other variants of fees exist where the cost of operating the mutual fund is distributed to the investors. These fees can include performance fees, entrance, and exit fees (Da Silva et al., 2018, p.276). The fee is usually determined by a percentage of the total assets being managed by the company/manager. The average management fee for actively managed equity mutual funds has steadily increased since the 1970´s. In the beginning of the 2000th century the average management fee increased to about 0,75% of the total assets managed (Malhotra & McLeod 1997).

The previous research regarding the relationship between management fees and the return of the mutual funds have concluded that there is no direct relation between a higher management fee and an increased return (Miller, 2010, p.12; Gruber, 1996). Contrary to this though there have been studies that have shown a positive relation between high-quality managers charged fee and the performance of the mutual fund. Based on this discovery a section of high-quality managers (with a proven track-record of high profitability) could charge a higher fee based on their performance. The study also showed that in the low-quality bracket of mutual fund managers, the lowest performers charge the highest fee. This was found to be the case because the short-term profit that comes with higher fees outweighed the present value of potential future income due to the mutual funds expected shorter life cycle (Berkowitz & Kotowitz, 2002, p.328). This would indicate that in most cases, a higher management fee is not equal to a higher return except in rare occasions where a perceived high-quality fund manager could justify a higher management fee based on their performance.

2.9.2 Fee & Performance

This study will study the relationship between the performance on sustainable mutual funds and the total expense ratio, according to Korkeamaki & Smythe (2004, p.425) a positive coefficient should stipulate that a higher total expense ratio does indeed lead to a higher return. The total expense ratio of a sustainable mutual fund can be justified *if* the total expense ratio is used in order for the fund manager to gather more information to create better investment decisions which ultimately leads to a higher risk-adjusted return (Dellva & Ohlson, 1998). It has been explained by Otten & Bams (2002, p.97) that increasing fees for a mutual fund in general should not reduce the performance of the mutual fund, hence according to Otten & Bams (2002) a higher total expense ratio should relate to an increased return for the investment in a mutual fund.

2.9.3 Total expense ratio

The expense ratio is similar to a management fee and can be described as "the percentage of total fund assets used to cover expenses associated with the operations of a mutual fund" (Navone & Nocera, 2016, p. 642). The difference between the two is that the management fee is incorporated in the expense ratio among other expenses like distribution fees and a residual component that is designed to cover auditing, legal fees,

and accounting fees (Navone & Nocera, 2016, p. 643). The previous literature regarding the effect of expense ratios on the return of a mutual fund have come up with inconclusive evidence to support either side of the argument. There have been studies which supported the argument of a negative relation between expense ratio and return of the mutual fund (Kaur, 2013, p.13; Singh & Tandon, 2021, p.299). On the contrary to these results, there have also been studies conducted which have found there to be a significant relation between the expense ratio and performance of the mutual fund (Prather et al., 2004, p.307). With other studies finding insignificant relations between expense ratios and performance (Ferreira et al., 2021, p.502-503). Based on these studies it can be concluded that there is no clear relationship between the total expense ratio and the performance of any mutual fund, rather the relation between the variables seems to be based on specific market locations and other correlating variables.

2.9.4 Years since registration of mutual fund

There are a lot of different characteristics that have an effect on a mutual fund's performance. In recent times the age of a mutual fund has become an increasingly discussed attribute to base the predicted mutual fund performance on. The results of the studies have been inconclusive, with different results of the statistical significance linking performance to mutual fund age. One argument for the relevance of age in the performance of mutual funds is that the mutual fund manager learns by their time in the market. Increased time in the market should lead to increased knowledge, which in turn should equal a higher return (Kaur, 2018, p.5). Time in the market is also perceived as a good indicator of how the fund can handle tough competition and external turbulence. This could also be an indication on the expertise and performance of the mutual fund (Prather et al., 2004, p.314). Several previous studies have found a relation between older age and increased return on the mutual fund (Belgacem & Hellara, 2011, p.222; Lobao, J & Gomes, S, 2015, p.141). On the contrary, there have also been studies that have concluded that the attribute of age has a negative relation to mutual funds' performance using risk-adjusted measures (Ferreira et al., 2012, p.502; Singh & Tandon, 2021, p.299). Where the authors stated reasons like saturation and smaller growth perspective in relation to younger mutual funds (Singh & Tandon, 2021, p. 297) as well as an increased agility in the market and a sense of urgency to prove themselves to sustain their operation by the younger funds (Ferreira et al., 2013, p.502).

2.9.5 Asset under management (AUM)

Asset under management (AUM), represents the total market value regarding the total assets that a specific mutual fund manages on behalf of others. There are two different ways for the total assets in a mutual fund to grow, either by an increased flow of investors' money or by an increased value of the funds underlying assets (Cicotello and Grant 1996). Thus, the AUM can be used as an indicator regarding a mutual fund's performance as the increase in fund size can be derived from either an increase in the underlying assets, or by a proven track-record that shows persistent performance by the fund managers (Singh and Tandon p.288, 2021; Chen et al., 2004). Different earlier studies have found different results regarding the relation between the AUM and the fund performance (Singh and Tandon, 2021). Some studies, such as Chen et al. (2004), Lobao and Gomes (2015) and Ferreira et al. (2012) have found a negative relation between the AUM or the size of a mutual fund in relation to a mutual fund's performance (Singh and Tandon, 2021). Whilst other studies conducted by Cicotello and Grant (1996), Belgacem and Hellera (2011) and Zabiulla (2014) has found a positive relationship between the AUM or the size of a mutual

fund in relation to its performance (Singh and Tandon, 2021). Thus, based on these studies there is evidence for a mixed relationship between the AUM and the fund performance, as different studies have found different results (Singh and Tandon, 2021).

2.9.6 Net asset value (NAV)

The Net Asset Value, usually known as the NAV describes the fund per share market value and is calculated at the end of every trading day and is influenced by the funds' performance (Prather et al., 2004). A study conducted in Tunisia shows that investors in general tend to actively search for mutual funds with a lower NAV, thus mutual funds with a lower NAV will attract new investors in order to gain market shares (Belgacem and Hellera, 2011). While mutual funds with a low NAV are preferred by investors as they possibly assume the market is undervalued, mutual funds with high NAV are viewed as more expensive and are assumed to be overvalued (Babbar and Sehgal, 2018). However, studies have shown that there is an insignificant relationship with the net asset value and the fund performance (Prather et al., 2004; Belgacem and Hellera, 2011).

3. Methodology

Below the choice of subject is explained, a large part of the section explains the scientific point of view where the philosophical views in the thesis are also expanded upon and explained. Furthermore, the research approach has been discussed and it has been explained what approach has been chosen.

3.1 Choice of subject

The authors of this study have a genuine interest for the stock market in general as well as an interest in investment strategies for individual investors. Sustainability in relation investing is something that the authors have found an increased interest for as its general relevancy has increased due to the situation around the world where there is a larger focus put into sustainability. There are new existing alternative investment strategies which provide the possibility for investors to act responsible and invest in sustainable mutual funds. The two authors of this study actively invest in mutual funds as well as sustainable mutual funds. The increased amount of sustainable mutual funds has made it easier to invest sustainably but has also made it harder for the end consumer to choose between the large amount of these. Thus, it is highly interesting for the authors to understand the relation between the total expense ratio and the return for the sustainable mutual funds to understand if a higher total expense ratio does increase the return for the investor.

Furthermore, the two authors of this study have plenty of experience in business courses and especially regarding financial courses on a master level. Both students will in the future work within the financial sector, thus, to study this subject will give the authors more experience within this field which will most likely be valuable for future work.

3.2 Pre-understanding

Together the two authors have several years of knowledge regarding the financial market as both authors have invested within the stock market as well as mutual funds and sustainable mutual funds. Although both authors have different investment styles and strategies it does give a depth to the study as both authors can have different insights and analyses to the study from their own experiences. An academic background within business courses and specifically finance courses give the authors an understanding to interpret theories and previous research which are obtained for the study. As both authors have studied at the same university and at the same programme there are several theories that have been taught at the university which are used in this study, as well as certain course books which have been used at the university have been chosen to be used at this study due to both authors combined studies. The two authors' combined knowledge within the same area is used to ensure that the study in general is impartial and that the results are objective. It is important for the authors to understand that any preconceptions regarding this subject in this study has to be put aside to ensure that the results presented in the study are both valid and reliable (Bell & Bryman, 2015, p.40-43). This is something that the authors have thought of and made sure to disregard any preconceptions regarding this subject.

3.3 Scientific point of view

Regarding the scientific point of view of a study, while conducting a study the author will always be faced with having to make assumptions regarding the development of knowledge. This can be derived from having to take a stance regarding the studies research philosophy. Research philosophy is a term that embraces different beliefs and assumptions of how information is developed. The beliefs and views are connected to the

way you see reality (which can be described as ontological assumptions), the way humans develop and interpret knowledge (known as epistemological assumptions) and how one's own beliefs and values influence the study (known as axiological assumptions) (Saunders, et al., 2019, p.130-131).

3.3.1 Ontology

The philosophy regarding ontology covers the nature of reality and how it is perceived. The way you as an author interpret your reality will influence how and what you decide to conduct your study on (Saunders, et al., 2019, p.133). For example, one person can perceive certain objects and situations in a completely different way than a person standing next to them depending on their interpretation of reality. Some things that could be seen differently in a business context could be management actions, organisations, and events (Saunders, et al., 2019, p. 133).

There are two different aspects (paradigms) to ontology, which consists of objectivism and subjectivism. Objectivism interprets social reality in the same manner as natural sciences. Meaning that according to objectivism the perceived reality is external to us as social actors. Objectivism says that social actors have no influence on the social reality and that there is no alternative interpretation of reality. This in turn means that objectivism believes that there is one objective reality that is experienced by all social actors, disregarding their own interpretation of it (Saunders et al., 2019, p.134-135). *Subjectivism* on the other hand is influenced by the assumptions from arts and humanities where social reality is something that is created by the perception of the beholder. An extreme form of *Subjectivism* is called *Nominalism* and argues that reality is created by social science by the usage of language, actions, and perceptions. This means that according to the *Nominalist* point of view there is no basal social reality that exists without the perception and actions of its social actors (Saunders et al., 2019, p.137). Based on these assumptions there is no objective reality, but instead each social actor experiences its own reality, which would indicate that multiple realities exist within this way of viewing reality (Saunders et al., 2019, p. 137).

This study will consist of analysing secondary data to determine if there is a relation between a higher expense ratio and increased return in sustainable mutual funds. To examine the connection between the different variables, statistical tests will be conducted. Because of the fact that this study will be analysing numeric data that is free from the need of subjective interpretation, the subjectivism point of view is not appropriate for this study as the assumptions of subjectivism is to subjectively interpret the world based on an individual view of reality. To match the objective of this research study, the study will be based on the view of reality called objectivism. This means that this study will take an objective stance free from subjective opinion in regard to its viewpoint towards data and how the conclusion and results are interpreted and presented later on in the study.

3.3.2 Epistemology

The issue regarding epistemological assumptions covers what is accepted as knowledge in different fields (Bryman & Bell, 2011, p.15). The two common approaches to epistemological assumptions are *positivism* and *interpretivism*. These two approaches are in many ways opposite of each other. *Positivism* is in many ways similar to *objectivism* in the way that the *positivistic* position believes that social reality can be studied in a similar fashion as natural science (Bryman & Bell., 2011, p.15). *Positivism* is based on

the belief that social reality is observable from an objective point of view and from those observations, generalisations can be made about different entities in the social reality (Saunders et al., 2019, p. 144). As p*ositivism* is based on the perspective of natural science, in many cases the studies are conducted by expanding on existing theory and creating hypotheses to test and possibly confirm. *Positivism* is usually connected to the quantitative methodology as the researcher strives towards being objective and neutral towards their research to avoid influencing the outcome of the research (Saunders et al., 2019, p.146).

Interpretivism was created to counter the view of positivism and takes a subjectivist view on reality instead of one based on objectivity (Saunders et al., 2019, p.148). Instead of seeing human beings as similar physical entities that are being studied under natural science, *interpretivism* argues that human beings and their social reality cannot be studied by using the natural science approach (Saunders et al., 2019, p.148-149). Because of the fact that, according to *interpretivism*, human beings have their own experiences and interpretation of reality which in turn reflects as their own experienced reality. This makes the broad generalisations being made by using natural studies a non-suitable option for understanding human complexity (Saunders et al.,2019, p. 149). With this focus on different perspectives and realities, *interpretivism* tries to take this complexity into account when conducting their research. This also indicates that *interpretivism* is subjective in nature (Saunder et al., 2019, p.149).

Positivism is based on epistemological assumptions on how to interpret reality. These assumptions include the idea that scientific research methods are the gold standard when it comes to understanding reality. Empirical observation of events is crucial to corroborate theories and explanations because without it the study will lack credibility, and finally that social research should incorporate reliable tools and techniques to in an appropriate way measure social phenomenon's without interfering and potentially altering the phenomenon in question during the data collection process (Denscombe, 2010, p.120-121).

Positivism is in short, as mentioned above, an approach towards the interpretation of the social reality with similarities towards natural science, where the positivist position sees the world as an objective reality, where patterns and regularities are already there and just need to be discovered. This translates over to how, from the positivist point of view, social reality is similar to the natural world in the sense that there are patterns, actions and consequences that follow a natural order (Denscombe, 2010, p.120).

This study will be based upon the positivistic point of view because of the nature of the study which will include a focus on a quantitative approach with numbers, measurable data and objective fact interpretations based on previous research and studies. Conclusively this means that this study will be based upon an approach similar to natural sciences as the authors will look at already existing entities (data) and try to connect it and find patterns in an already set objective reality with predefined rules and boundaries. The study will be based on already existing theories from which the goal is to expand and build upon that existing knowledge. This study will not be based on the interpretivist point of view as the subjective stance regarding reality and experiences do not go in hand with what is considered appropriate data, in this case numbers. The goal of the study will also be to try and draw generalised conclusions regarding the overall sustainable mutual fund market which is not a possibility according to the interpretivist point of view, as they view

every entity as an individual that cannot be put into a pattern to which you can draw broad generalised conclusions.

3.4 Research approach

3.4.1 Deductive study

As this study will use historical data gathered from the last ten years it will be done through a quantitative method with a deductive approach as it fits well with a quantitative research approach (Bell & Bryman, 2017). An inductive study is often unorganised where the idea is to build the conclusion based on a large variety of observations whilst a deductive study is organised, and the conclusion is based on already existing theory. Contrary to a deductive study, an inductive study aims to create a new theory based on the research which is not suitable for this thesis (Bell & Bryman, 2011, p.13). As this study will analyse the relation between the total expense ratio and the return for sustainable mutual funds by analysing existing theories, there are no new theories generated from this study, thus it is obvious that a deductive approach is suitable for this study.

As seen by figure 1, the process for a deductive study is as displayed and this study thoroughly follows the same steps when conducting this thesis as a whole. As this study will base its hypotheses on already existing theory and continue the same path as figure 1 shows it is obvious that a *deductive* approach is suitable for this study.

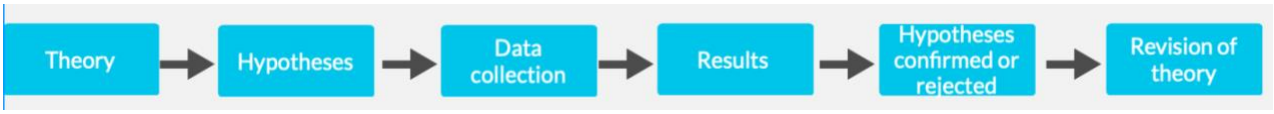


Figure 1. Own replica of the deductive study process, source: Bryman & Bell, 2011, p.26).

3.4.2 Quantitative study

The study is based upon empirical data where the research derives from actual observations and the data are in the form of numbers, the ESG score has had a major impact in the data collection as it has been the deciding factor concerning the collection of the data. The decision to go with a quantitative method was done since the research paper aims to study the relation between the total expense ratio and sustainable mutual funds. Thus, to present the results in numerical terms and to draw general conclusions concerning the relation to the variables the idea to do this study in a quantitative way was a natural choice. When using a quantitative research design there are several units that are studied in depth to be able to draw generalizable conclusions (Bell & Bryman, 2017). Studies have shown that quantitative research approaches tend to be more objective in relation to qualitative research approaches, as this study aims to be objective, a quantitative research approach is appropriate (David & Sutton, 2016). As the study has gathered data through Refinitiv (2022), the data is not open for any type of interpretation, the data collected will be objectively gathered and presented.

3.5 Choice of literature

The two authors have used the available database found via Umeå University, which has the name of *Umeå UB database* as well as *Google Scholar* to find relevant scientific articles and books for this study. To find the relevant scientific articles required to conduct this study the authors have used keywords to narrow down the results from the searches.

Table 2. Keywords used to find relevant articles

Central keywords	Specified keywords
Sustainability *Mutual funds* *Sustainable mutual funds* *Total expense ratio* *Management fees* *Sustainable investments* *ESG* *ESG-score* *Mutual funds return*	*Return* *Random walk* *Fama & French three model theory* *CAPM* *Effective Market Hypothesis* *Modern portfolio theory* *Asset under management* *Carhart 4 factor model*

As mentioned by Saunders (2019) the two sources that are most likely to be useful are: secondary literature sources and grey (primary) literature sources. Secondary literature sources are formally published items, e.g., journals and books, while primary literature sources are printed in electronic formats and are produced by governments, industry, and academics (Saunders, 2019, p.83). It is important to understand this theory is not related to *primary and secondary sources.*

For the most parts, this study uses primary sources to collect information to conduct the study, primary sources are those where e.g., theories are published for the first time in an article, while secondary sources are those where a known theory is retold in a course book. This study has mainly used journals and books to find theories and to conduct this study, thus *secondary literature* is the main literature used which have been retrieved via Umeå University's database as well as via Google Scholar using both central and specified keywords. Books have been useful as well, such as course books which have been presented to the two authors during courses taken at the university, specifically course books used in financial courses.

3.5.1 Source criticism

As this study has used a deductive approach it has to use literature to identify and apply theories which are used when testing the data collected, as deductive approach uses data to evaluate propositions and hypotheses related to the existing theories (Saunders, 2019, p.153). It is important that the literature used in the study are of high standards and that these can be trusted. There are four criteria's which are suggested to be followed in order to assess the quality of documents and sources: *Authenticity,* "is the evidence genuine and of unquestionable origin?", *Credibility,* "is the evidence free from error and distortion?", *Representativeness,* "is the evidence typical of its kind, and, if not, is the extent of its untypicality known"?, *Meaning,* "is the evidence clear and comprehensible"? (Bryman & Bell, 2011, p.545). Thus, to improve the quality of the study, the authors have assessed the sources used by following the criteria's mentioned above to ensure that the sources are credible and reliable. Furthermore, the databases used to collect articles are "*peer-reviewed"* in which the articles have been independently audited, which increases the credibility of the sources. Books have been used, when necessary, in order to collect definitions and theoretical frameworks regarding the basic idea of conducting a study of

this magnitude, however the authors have been cautious and used books that have been presented by the school as course books as well as well-known authors that are credible in order for the data collection to have "*credibility"*.

It must be understood that the theories gathered for this study are based on sources that do not primarily originate from Sweden, as this study uses both the Swedish market as well as the U.S. market it has to be addressed that some theories are not necessarily applicable to both markets. Examples of this could be the fact that the average size of mutual funds in general is larger in the U.S. market in relation to the European market where the size of mutual funds is relatively smaller (Otten & Bams, 2002, p.98). Ferreria et al., (2013, p.485) displays another example of this as the authors explain how small mutual funds a better performance rate in comparison to large mutual funds in the U.S. have, which is contrary to the results that are applied to the rest of the world where there is a positive relationship between size and performance. Hence, considering this, it is very important to be cautious when applying theories gathered from other countries when conducting this study. The authors have taken this into consideration and have used and collected theories where some have been used in different studies which have theories that originated from one country but apply to another.

3.6 Method criticism

The main point of criticism regarding the method of choice is the studies' reliance on secondary data. Secondary data can be described as collections of data which have not been collected for the specific purpose of a study. A study which is built upon secondary data can be criticised because the study's conclusions are solely reliable on data which is not collected or verified by the authors themselves. This means that the data can be affected by external biases and limitations regarding the studies scope and goals (Trinh, 2018). Regarding limitations, this study has encountered some limitations about the data sampling as we have encountered lapse of data in relation to some mutual funds. This includes missing data points in the total expense ratio and ESG-rating area. The studies reliance on secondary data and accompanying missing data point could be considered negative to the studies reliability, but due to the large sample size and Thomson Reuters reputation as a reliable provider of financial data we do not consider this an issue.

Regarding the chosen time-period of five years to evaluate the chosen mutual funds returns, it could be considered to be too short of a timespan to give a true evaluation of a fund's overall financial performance as previous studies made in a similar field have chosen lengthier timespans to evaluate fund performance (Kaur, 2018; Otten & Bams, 2002). In our case we balanced the advantages of a higher number of data points against the detrimental effects to validity that comes with an increase of data omissions. In this study we chose to prioritise a smaller amount of data points to limit the discrepancies that come with a large amount of data lapses and therefore settled for a time-horizon of five years to evaluate the chosen mutual funds financial performance.

4. Practical methodology

The section below explains the main parts of the data collection, in general how the data was collected and what the sample criterias were. Furthermore, it is explained how outliers were observed and handled in the thesis. The hypotheses of the study are displayed and the main theories that are used in the regression models are further explained in this section.

4.1 Data collection

The data is collected through the database Eikon (Refinitiv, 2022), where a template has been created to insert the required criteria needed for the data collection. The template consists of different screening criterias to ensure that the data samples are valid and correct. The selections used are: ESG score, total expense ratio and fund domicile (for Sweden & United States). To further analyse the data collection, the template included the total return 5 years to last month which is set from the date 2022-03-29, the Sharpe ratio for 5 years to last month and finally the tracking error for 5 years to last month. The variables total expense ratio, Sharpe ratio for 5 years to last month respectively tracking error for 5 years to last month is this studys independent variables. However, the total expense ratio is considered as the main independent variable, and the other mentioned variables will be included in the form of control variables. The dependent variable for this study is the 5-year performance to last month. The ESG score was also conducted, and the screening criteria was set for an ESG score at 75 or above. This since Refinitiv (2022) consider that score reflect a high standard sustainable mutual fund. However, it is worth mentioning that no mutual funds were excluded from the data collection even with an ESG score below 75. This was purposely done to have all the data accessible in case the limitation of the ESG score had to be stretched. As it was discovered that mutual funds registered in Sweden with an ESG score of ≥ 75 could not be considered as normally distributed, the limit of an ESG score of ≥ 75 had to be changed to a score of ≥ 50. In contrary, the mutual funds registered in the U.S. with an ESG score of ≥ 75, could be considered as normally distributed. Therefore, to ensure a correct comparison between the two markets, it was decided that an ESG score of ≥ 50 would be used for both markets.

By using the database Eikon a screener was built via “fund screener”, two data samples were collected. One data sample consisting of Swedish registered mutual funds and another one consisting of U.S. registered mutual funds. The screener in Eikon was used to build a template consisting of necessary criterias to collect the data required to conduct the study. The template that was built had criterias such as “sharpe ratio for 5 years to last month”, “tracking error for 5 years to last month” as well as “5-year performance to last month”. The general idea behind the criteria being 5 years to last month, and not 5 years to date, is because the study wanted to grasp what the actual performance was when the study was first put into writing. The data requested via Eikon’s screener through the template that was built was downloaded through Excel in which it was later imported and analysed in SPSS.

Furthermore, one screening criteria is “selection of domicile” in which Sweden and the United States have been chosen, thus, the mutual funds selected are domiciled in the two selected countries. When selecting mutual funds from the Swedish market and the U.S. market, the study has limited the mutual funds to be registered in each respective market's domicile. Thus, when referring to each market the mutual funds must be registered in each respective country to be part of the data sample. As the mutual funds are based on domicile and not specifically on markets there is a selection of mutual funds from Sweden

and the U.S. that are not included in this study as they have different domiciles than what is included in the screening criteria. The available mutual funds throughout the Swedish market in comparison to the U.S. market are significantly smaller due to the size of the mutual fund market in Sweden. Therefore, the data collection will include more mutual funds from the U.S. market as there are more registered mutual funds from this country of domicile.

An observation that deviates from other observations when outlying the observations is defined as an outlier, thus any eventual data-errors can be explained by outliers as the main cause for these (Greene, 2012, p.141). However, as said by Greene (2012) it must be understood that removing any outliers will not improve the data. On the contrary it might affect the data thus making it a questionable decision to do such. Hence, the researchers should carefully handle these outliers by finding the explaining factors behind these outliers (Greene, 2012, p.141).

A few observations that seemed to deviate from the other observations in the models have been defined as outliers in this study. These have mainly been observed when doing residual plots. When observing each labelled observation, it was easy to notice which observation deviated from other observations. There are three models that can be derived from the residual plots to detect and handle outliers which can have an impact on the regression models (Young, 2018, p.167). The three models that can be used are the following:

1. Any observations with a standardised residual absolute value larger than 3 is considered as an outlier, hence the standardised residuals are important and interesting to put focus towards (Young, 2018, p.155).
2. Grubb's test is useful to use if the residuals are normally distributed and if the data sample is large (Young, 2018, p.156). Hence, to use this test some sort of residual plot must be conducted to assume that normal distribution is met. This study has a large sample size and the results from the residual plots indicate that they are normally distributed. All observations that should be tested as an outlier are those with the highest and lowest residual value (Young, 2018, p.172).
3. Finally, if it is difficult to detect outliers using the two models above, there is another way to observe if there are outliers present. Robust statistics are one way to detect outliers, outliers are identified depending on their deviation from the robust fit (Young, 2018; Rousseeuw and Hubert, 2011, p.73).

The detected outliers must be handled by caution. As Greene (2012) has told, removing outliers is not necessarily the best option. The first thing that must be done when an outlier is detected is to examine whether it is an outlier by chance or if it is a data-error behind the rise of the outlier. If it is due to data-error or another underlying problem there is cause for removal of the outlier (Young, 2018, p.167). This study checked for outliers by using the first model explained by Young (2018), the outliers that were detected were subject for further analysis to find any explanation behind them. Furthermore, scatterplots can be used for the study to detect outliers as well, to further analyse if outliers are present in the study scatterplots were used. The outliers which were the result of data-error or other underlying problems were removed from the data collection. The few outliers that were noticed could be explained by its major deviation from the average total expense ratio, due to the major deviation it could be concluded that it was data error behind this and the outliers were hence excluded.

4.1.1 Currencies

The data sample consists of data from two different domiciles, in this case Swedish domiciled sustainable mutual funds as well as U.S. domiciled sustainable mutual funds. For the study to be relevant to each specific market the decision has been taken to use each market's own currency when conducting the regression models. Hence, this study uses SEK and USD as currencies to match the respective markets' economies and receive relevant results.

4.2 Sample criteria of mutual funds

The choice of mutual funds has been based upon the screening criteria's, all mutual funds that have an ESG score of 50 or above have been collected and included in the data sample, the study has excluded mutual funds with an ESG rating below 50. According to Eikon's own ESG rating system, all ESG ratings above 75 can be seen as high standard sustainable mutual funds, as scores within this range indicates a high degree of transparency as well as a great ESG performance (Refinitiv, 2022). The scores range from 0-100, with four different quartiles, a score within the range of ≥75 to 100 is in the fourth quartile (Refinitiv, 2022). The first idea was to use the fourth quartile as the score-limit, but after the regression models were conducted it was discovered that using exclusively the sustainable mutual funds with scores from the fourth quartile, the sample was not considered as normally distributed. This led to the decision of including sustainable mutual funds that has a score of 50 and above (either in the third quartile or the fourth quartile). As the data sample is collected through Eikon, and the ESG screening criteria is based on Eikon's ESG rating, the decision has been taken to use Eikon's ESG criteria as the method to determine the ESG score. As the limit has been set to a score of 50, there can be mutual funds which can be considered as sustainable but have been discharged and excluded from this study as the study uses the ESG criteria's from Eikon. The custom for the data collection is to have at least ten years of historical data for the study and the results to be considered as reliable. Therefore, the collection of mutual funds has been limited to exclude any mutual funds with historical data that is less than ten years (Gil-Bazo & Ruiz-Verdú, 2009). In general, a large sample usually generates a more precise result, hence according to Bryman & Bell (2019) the authors of a study must take this into consideration when deciding the size of the sample as the decision should be based on what sampling error that the authors are prepared to accept.

To help us gather comparable results from our sample basis we have based our sample selection on the assumptions below:

- The mutual funds total expense ratio is considered to be constant over the five-year period.
- It is assumed that all transaction costs are included in the total expense ratio.
- The amount regarding initial purchase amount has not been taken into consideration.

4.2.1 Increase – Sample selection

The sample selection was first and foremost due to be based upon the ≥ 75 rule regarding the ESG score which was gathered from the scale which is built by Eikon (Refinitiv, 2022). This however resulted in the Swedish mutual fund market to be limited to a small selection of available mutual funds which could be considered as sustainable with a limitation of an ESG rating of 75 or above. Furthermore, due to the limited amount of

available mutual funds with an ESG score of 75 above the results from residual plots could not be assumed to be normally distributed. Hence, the decision was taken to expand the sample selection from ≥75 to≥ 50 in order to be able to collect a larger sample to achieve the requirement of normal distribution. This was primarily done for the Swedish market as the total number of mutual funds registered in Sweden at the date for collection was 786 and with an ESG limit of ≥ 75 the amount of sustainable mutual funds was not considered as normally distributed. To ensure that the results for both markets could be comparable the sample selection for the U.S. market was increased as well from ≥75 to ≥50 as for the Swedish market. Thus, not only was the Swedish sample size increased but the U.S. sample size as well to ensure comparability among the two markets.

4.2.2 Mutual fund types

It is highly important to understand that there are different types of sustainable mutual funds, although sustainable mutual funds are a niche of its own there are different categories of sustainable mutual funds. Sustainable mutual funds can be divided into different types, such as *equity sustainable mutual funds* and *bond sustainable mutual funds*, and according to Hård af Segerstad & Pettersson (2012, p.4) the fees for bond mutual funds are in general lower than the fee for equity mutual funds. Hence, this must be taken into consideration when presenting the results, as the type of sustainable mutual fund can answer the total expense ratio for a specific sustainable mutual fund. Likewise, the total expense ratio for actively managed sustainable mutual funds is in general higher than the total expense ratio for passively managed sustainable mutual funds.

4.3 Financial metrics

The below stated financial metrics have been used in the study's regression models in the form of independent variables, and they have been chosen due to their ability to explain the chosen research question.

4.3.1 Sharpe Ratio

The Sharpe ratio takes the risk adjusted return into consideration. A high Sharpe ratio indicates that there is a high return of the sustainable mutual fund in relation to the risk taken, while a low Sharpe ratio indicates that the return of the sustainable mutual fund is low in relation to the risk taken (Bodie et al., 2011, p 160; Sharpe, 1966, p.120). Thus, the calculations can be related to the excess return in relation to any increased risk, hence, each sustainable mutual funds risk in relation to return is calculated (Sharpe, 1966). For this study the Sharpe ratio has been retrieved via Eikon (Refinitiv, 2022). The Sharpe ratio is used in this study as a control variable to further analyse the relationship between the 5-year performance to last month and the total expense ratio for both markets. The Sharpe ratio uses the risk-free rate and for the U.S. market the ten-year treasury bond is the base for the risk-free rate while for the Swedish market it is the STIBOR which is the base for the risk-free rate.

4.3.2 Tracking error

Tracking error as explained earlier on is defined as the difference in volatility between the mutual funds return and its benchmark index (Rasmussen, 2003). It can be used as a tool to understand whether the selected sustainable mutual funds can be considered as actively or passively managed, which can be concluded by controlling what value the tracking error has (Cremers & Petajisto, 2009, p.3330). Thus, depending on what value the tracking error has it can be determined how close or how much it deviates from its

benchmark index (Cremers & Petajisto, 2009). When doing the regression models the tracking error was included as an additional variable in the multiple regression model. The tracking error could hence be used as an indicator to whether the sustainable mutual fund could be considered as actively managed or passively managed. A sustainable mutual fund considered as passively managed as it follows its benchmark should have a tracking error close to 0% (Rasmussen, 2003). There is no actual evidential value for tracking error for it to be considered as actively managed, but according to Cremers & Petejisto (2009) any value above 4% can be considered as actively managed. Below is the formula for tracking error presented and its components specified.

4.3.3 Total expense ratio

The total expense ratio was calculated via Eikon (Refinitiv, 2022), as explained earlier in the study the total expense ratio will be used to cover the fees for sustainable mutual funds. The total expense ratio in this study has been used in two independent simple regression models to understand and study whether the total expense ratio has a relation to the total return for 5 years to last month. Depending on what value the total expense ratio is it can be determined whether it's considered as a high or low value for the type of mutual fund it is. In general, passively managed mutual funds have a lower total expense ratio than actively managed mutual funds where a higher total expense ratio is accepted. The total expense ratio has been presented in decimal format, however the total expense ratio is defined in percentual format.

4.4 Statistical hypothesis

As the purpose of this thesis is to answer the question whether there is a relationship between the total expense ratio and the performance over 5-years on sustainable mutual funds or not, some statistical hypothesis has been formed. The study's hypothesis has been designed to answer the purpose of the thesis. The statistical hypotheses for the linear regression models are stated below in $H_{01,}$ $H_{a1,}$ H_{02} and H_{a2}. These hypotheses are formed the same way, the only difference being that H_{01} and H_{a1} is for the Swedish market while H_{02} and H_{a2} is for the U.S. market. Since both the simple regression model and the multiple regression model tests the same thing, the hypothesis will be identical. However, a choice was made to display them only once.

H_{01}*: There is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the U.S. market.*

H_{a1}*: There is a significant relation between the total expense ratio and the 5-year performance to last month sustainable mutual funds in the U.S. market.*

H_0^1: $\beta_1 = 0$
H_A^1: $\beta_1 \neq 0$

H_{02}*: There is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the Swedish market.*

H_{a2}*: There is a significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the Swedish market.*

H_0^2: $\beta_2 = 0$

H_A^2: $\beta_2 \neq 0$

4.5 Analysis of data

When the data required for the thesis had been collected, the study proceeded with conducting an appropriate regression analysis. The results from the regression analyses have been presented and explained using relevant theories which have been described earlier on in the study.

4.5.1 Simple & multiple linear regression

Linear regression is one of the most efficient ways of determining relation and degrees of explanation between different variables. The basis of linear regression is an algebraic equation that takes the form of a linear equation that is being drawn inside a graph, where the inclination of the line is based on information and values from the intercepts. The line represents the relation between the dependent and independent variables (Y & X) axis (Collis & Hussey, 2014, p.281-282). Presented below is the linear regression model followed by a specification of its components (Collis & Hussey, 2014, p.282).

$$Y = \alpha + \beta x + \varepsilon i$$

Where:
α = The parameter corresponding to the intercept
β = The parameter corresponding to the slope
ε = Random error term

There are two types of linear regression, simple and multiple linear regression. The simple linear regression only examines the degree of explanation in the dependent variable with one single independent variable. While the multiple linear regression examines the degree of explanation in the dependent variable by two or more variables (Collis & Hussey, 2014, p.282-283). The focus of this study is to examine the relationship between the total expense ratio and the return on sustainable mutual funds, and to examine this exact relationship two simple linear regressions have been conducted where only one independent variable (total expense ratio) is examined. In addition to these two regression models, the study has conducted two multiple linear regressions where two additional variables have been added to the model. This was done in the interest of increasing the degree of explanation in the models and hopefully adding interesting perspectives on the impact of additional variables.

- The first model examines the relationship between the total expense ratio and the financial return over five years to last month in a linear regression model based on the US market.
- The second model examines the relationship between the independent variables total expense ratio, tracking error and Sharpe ratio and the dependent variable financial performance over 5 years to last month in a multiple regression model based on the US market.
- The third model examines the relationship between the total expense ratio and the financial return over five years to last month in a linear regression model based on the Swedish market.

- The fourth model examines the relationship between the independent variables total expense ratio, tracking error and Sharpe ratio and the dependent variable financial performance over five years to last month in a multiple regression model based on the Swedish market.

Based on the definition of a general linear regression (Collis & Hussey, 2014, p.282) the studies primary linear regression equation is stated as following:

- Linear regression (For model 1 & 3):
  yi = β0 + β1 * total expense ratio + εi
- Multiple regression model (For model 2 & 4)
  yi = β0 + β1 * total expense ratio + β2 * tracking error + β3 * sharpe-ratio + εi

Where:
yi = 5-year financial performance to last month, in the form of *total return 5 years to last month*
Total expense ratio = Total cost of a managed investment fund
Tracking error = The difference in volatility between the mutual funds return and its benchmark index, calculated by $\sqrt{\sum_{i=1}^{n} \frac{(R_b - R_p)^2}{N-1}}$
Sharpe ratio = A tool to understand investments return and its risk, calculated by $R\,\frac{R_p - R_f}{\sigma p}$
β = Measure of risk

4.6 Multicollinearity

When two independent variables are highly correlated in a regression model there is a risk for multicollinearity which can cause the results from the regression model to be numerical unstable as well as causing the results to be imprecise (Moore et al., 2011, p.610). Furthermore, if multicollinearity is present the conclusion of the analysis can be questioned due to the lack of accuracy in the estimations because of the high variance in the estimators (Salmerón et al., 2018, p.2365). Hence, according to Salmerón et al., (2018) the detection of multicollinearity must be a required first step in an analysis.

It might be difficult to observe multicollinearity in the regression model if there are a lot of explanatory variables. However, to be able to detect whether there is multicollinearity present in the regression model or not the Variance Inflation Factor (VIF) has been monitored. The VIF value is presented for each explanatory variable, and the VIF is an index for how much multicollinearity has increased the variance of an estimated coefficient (Studenmund, 2015, p.273). By monitoring the VIF in SPSS it can be detected whether multicollinearity is present or not (Salmerón et al., 2018), Marquardt (1970) suggests that a VIF value above 10 indicates that there is multicollinearity and uses any value above 10 as a guideline for serious multicollinearity. Hence, this study has used the indicator as used by Marquardt (1970) and as the VIF value for all regression models has been below 10 the conclusion drawn is that there is no multicollinearity present in this study.

4.7 Standard deviation

The definition of standard deviation can be described as the difference between the mean and the data points and is calculated as the square root of the variance. A large standard

deviation in relation to the mean indicates that the mean does not represent the observed data in an appropriate way.

The formula that describes the standard deviation (sd) is the following:

$$sd = \sqrt{\frac{\sum(x - \bar{x})^2}{n}}$$

x = an observations
x (-) = the mean
n = total number of observations
√ = square root
∑ = the sum of

(Collis & Hussey, 2014, p.249)

4.8 Standard error

The standard error can be described as the standard deviation between the collected samples of different means. This is calculated by summarising the difference in the sampled means in relation to the overall mean, squaring the calculated differences and dividing them with the total amount of received samples. When it comes to interpretation of standard error, a large standard error is indicative of a result that is not representative of the whole sample population, while on other hand, a small standard error is indicative of a correct representation of the sampled population (Collis & Hussey, 2014, p.250).

5. Empirical results & the linear regression model requirements

The following section displays the results of the regression models via tables, which are presented below. Furthermore, each regression model conducted has a model diagnostic where the residuals are analysed to confirm the assumptions or requirements made in the regression models. The hypotheses will be discussed in relation to the discovered results.

This chapter will consist of presentations and evaluations of the conducted regression models and their connection to the stated hypotheses. The process will be to first present the conducted regression models and the results that can be derived from it. Afterwards, a review of the model's residual plots will be examined to ensure that the models can be considered as reliable. The residual plots have been conducted and analysed in SPSS as the rest of the regression models. It is important to remember that the analysis of the residual plots cannot be taken as a guarantee of the model's reliability. This is because the interpretations of the residual plots are of a subjective nature and therefore cannot be seen as an objective truth. The last part of each section will consist of a statement and conclusion regarding the connected hypotheses and if it should be accepted or rejected depending on the results that can be derived from the statistical models.

As mentioned previously the regression models and residual plots have been conducted and analysed with the help of the statistical program SPSS. The regression models consist of independent and dependent variables, with the independent variables' significance levels displayed as a numerical number, together with the regressions adjusted R-square and other important key figures like standard error and standard deviation.

5.1 Model diagnostic

When doing regression analysis, it is important to observe and examine the residual plots to confirm that the assumptions are met when conducting a regression analysis. Furthermore, the residual plots are used to determine whether the residuals are normally distributed or not. It is specifically the "normal probability plot" and the "histogram" that are used to determine the normal distribution. According to Yan and Su (2009, p.195), there are four different requirements or assumptions to be achieved to properly evaluate the regression model's reliability and trust the conclusions drawn from it. The requirements are controlled by observing the residuals that are retrieved via SPSS.

The four requirements are as following:

1. The residuals shall have a linear relationship, if so, it is a good indicator that the model explains a linear relationship between the independent variables and the dependent variable.
2. Homoscedasticity must be fulfilled, if so, all residual plots have the same constant variance.
3. The residuals in the models shall be normally distributed.
4. The residuals shall be independent and free from random errors

Yan and Su (2009, p.195)

5.1.1 Linearity

The first requirement stated that the residual shall have a linear relationship. In order to see if this requirement was fulfilled, a scatterplot was created and examined. The

scatterplot shows the residuals relationship towards the fitted values. When linearity exists, the residuals have a value around 0 and do not show signs of a pattern (Yun & Su, 2009. p.195).

5.1.2 Homoscedasticity

The second requirement is to examine whether homoscedasticity or heteroscedasticity is present in the regression model, this can be tested by using a Breusch-Pagan test. The Breusch-Pagan test is considered to be an effective and reliable test to test the residual heteroscedasticity (Yun & Su, 2009. p.201). However, in this case, due to time-limitation and additional alternatives the study has decided to look at the relevant scatterplots and histograms to determine and ensure that the studies' regression models follow the laws of constant variance.

5.1.3 Normal distribution

The third requirement is that the residuals in the model should be normally distributed. To control if the model follows the third requirement, a Shapiro-Wilk test will be conducted to ensure normal distribution among the residuals. When interpreting a Shapiro-Wilk test, a significant score lower than 0,05 indicates that the residuals are not normally distributed (Yun & Su, 2009, p.196). As told by Gupta et al., (2019, p70) a Shapiro-Wilk test is considered as more reliable for sample sizes less than 50, as this study has a sample size considerably larger than 50 it can be assumed that the Shapiro-Wilk test is not appropriate. Hence, due to the studies' high sample size, the study has decided to look at the regression models probability plot and histogram instead of conducting a Shapiro-Wilks test to ensure that the studies' regression models residuals are normally distributed (Gupta et al., 2019, p.70). This has been done as the residuals for probability plot and histogram is another way to determine the normal distribution of the residuals.

5.1.4 Autocorrelation

The fourth requirement is about autocorrelation and to examine whether autocorrelation is present. More specifically, autocorrelation is characterised by the residuals not being independent. To control the existence of autocorrelation a Durbin-Watson test is conducted and examined in SPSS to establish that the requirement of independent residuals is fulfilled (Yun & Su, 2009, p.235).

5.2 Regression model 1 & 2 - U.S. market

Two regression models were conducted for the U.S. market, one simple regression model and one multiple regression model. These will be presented and explained below. The empirical results of these regression models will be followed by a presentation of the OLS requirements that had to be fulfilled for those models.

5.2.1 Model 1 - Simple regression model

The first conducted regression analysis has been done to analyse the relation between the total expense ratio and the return of the sustainable mutual funds for the last five years to the last month (2022-03-29) of the sustainable mutual funds. This has been done for the authors to answer the hypotheses which is to find out whether a higher total expense ratio results in a higher return.

The study first looked at a simple linear regression model with five-year performance as the dependent variable and Total Expense Ratio as the independent variable. In table 6, the regression model shows that there is a significant relation between the last 5 years' financial performance to last month and the total expense ratio in the US market, the relationship is significant on a 95% significance level with a significance of <0.001. Tabell 4 shows that the adjusted R-square of the model is 0,007 (0,7%). The adjusted R-square is a measurement to see how well the variation in the chosen dependent variables can be explained by the model independent variables. This measurement goes from 0-1 and a high number equals a high degree of explanation (Renaud & Victoria-Feser, 2010, p. 1852-1853). In this case it means that the return over the last five years to the last month (2022-03-29) can only be explained by the total expense ratio for about 0,7%, which is not considered as a high degree of explanation and indicates that even though there is a statistical significant relation between the variables, there are other factors/variables that can explain the variation in financial return to a more extensive degree than total expense ratio. Table 6 showed a marginal negative relation between the last five years to the last month financial return and the total expense ratio of -7.512. This means that by increasing the mutual funds expense ratio, the mutual funds return decreased in the last five years. This indicates that a higher expense ratio does not always equal a higher return.

Table 3-6. Simple regression model testing the relationship between the total expense ratio and the 5-year performance to last month for the U.S. market

Variables Entered/Removed[a]

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

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.088[a]	.008	.007	35.9866323

a. Predictors: (Constant), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27415.547	1	27415.547	21.170	<.001[b]
	Residual	3500486.913	2703	1295.038		
	Total	3527902.461	2704			

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. Predictors: (Constant), Total Expense Ratio

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	72.393	1.565		46.251	.000
	Total Expense Ratio	-7.512	1.633	-.088	-4.601	<.001

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.2.2 Result of hypothesis-test

The main purpose of the simple linear regression model for the U.S. market was to answer whether H_{02} could be rejected or not. In tables 3-6 above the empirical result of the

regression is presented. H_{02} follows that there is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the U.S. 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 5-years on the U.S. market for sustainable mutual funds. However, in table 6 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 five-year performance to last month.

5.2.2. Model diagnostic simple regression model - U.S. market

By assessing the regression models residual plots based on previously mentioned requirements (Yun & Su, 2009, p.195), it can be determined if the models are reliable and if these can be trusted to draw conclusions from the results. With the help of figure 2 it can be assessed whether the residuals have a linear relationship or not, this can be done by examining the scatterplot and the locations of the residual plots around the centre of the scatterplot (0.00). A linear relationship can be seen by observing the scatterplot in figure 2 as there is a similar distribution between the centre dividing the plot at the 0,00 value. As there is no major difference between the distribution between the plots, it can be determined that there is a linear relationship between the residuals, hence the first requirement can be considered as fulfilled (Yun & Su, 2009, p.195).

Furthermore, figure 2 is used to determine whether there is homoscedasticity or heteroscedasticity present in the regression model which is the second requirement (Yun & Su, 2009, p.195 Figure 2 has signs of homoscedasticity as there seems to be no signs of "cone-formation" in the scatterplot which indicates proof of heteroscedasticity (Studenmund, 2015, p.102-103). Hence, as homoscedasticity is confirmed, the second requirement can be considered as fulfilled (Yun & Su, 2009, p.195).

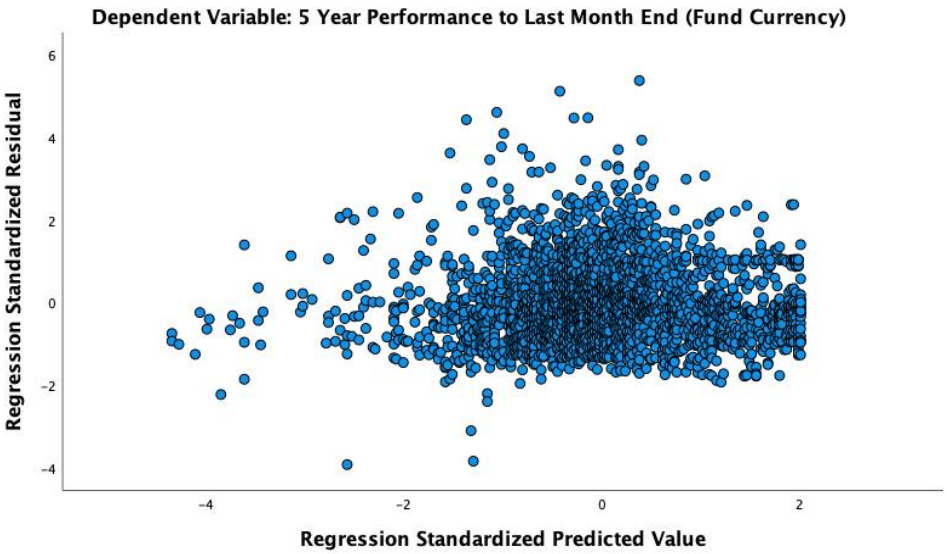


Figure 2. Scatterplot which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the simple regression model based on the U.S. market.

Furthermore, if figure 3 is analysed, it can be determined whether the residuals are normally distributed or not. Figure 3 indicates that the residuals are normally distributed as there is no major deviation from the linear equation. However, there are some minimal

deviations present in the middle parts of the normal probability plot, but due the minimal deviation the residuals can still be considered as normally distributed. Additionally, the histogram from figure 4 indicates that the residuals for the simple regression model in the US market are normally distributed, hence with the use of the two figures it can be confirmed that the residuals are normally distributed, hence requirement 3 can be considered as fulfilled (Yan & Su, 2009, p.195).

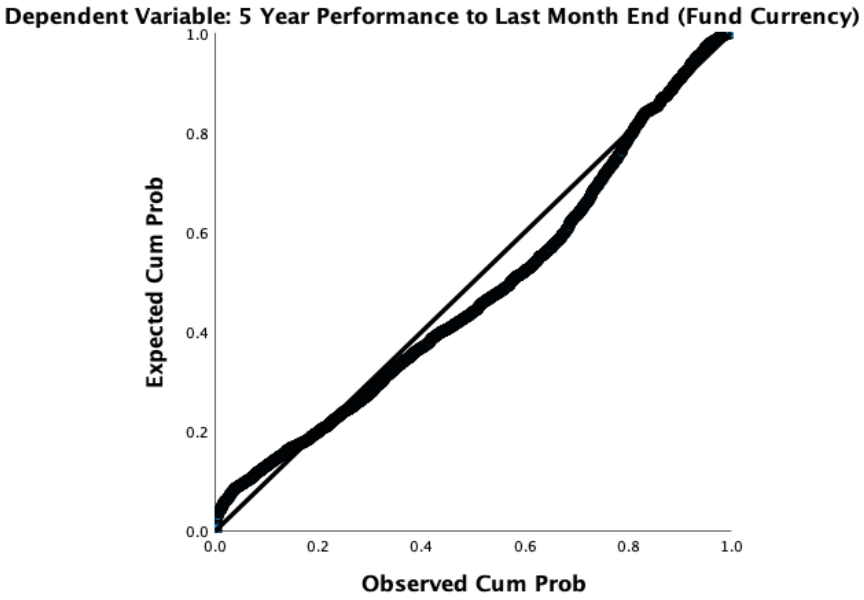


Figure 3. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the simple regression model based on the U.S. market

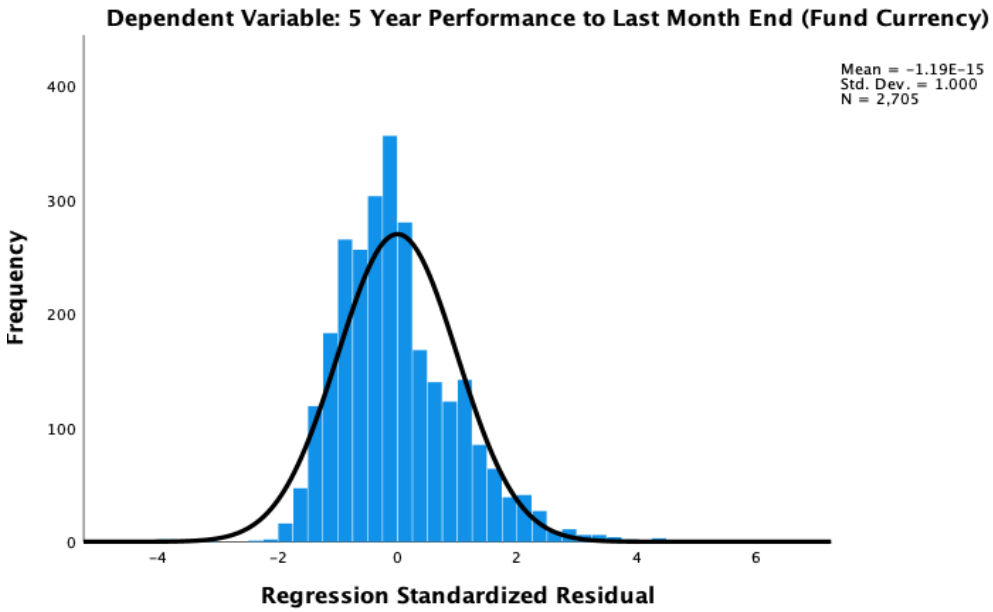


Figure 4. Histogram which is set to determine the normal distribution regarding the residuals from the simple regression model based on the U.S. market

To confirm whether the residuals are independent or not, which the residuals must be in order for the regression model to be acceptable a Durbin-Watson test was conducted. Table 7 indicates that the Durbin-Watson had a value of 1.799, which is enough to accept the assumption that the residuals are independent. Hence, as the value is close to 2.000 it can be considered that the fourth requirement is fulfilled (Yan & Su, 2009, p.195).

Table 4. Durbin-Watson test which is set to determine the independence of the model's residuals for the simple regression model based on the U.S. market

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.067[a]	.004	.004	38.0974222	1.799

a. Predictors: (Constant), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

To examine whether multicollinearity is present or not the coefficients in table 8 containing "Statistics VIF" are used. The simple regression model for the U.S. market has a 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.

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			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	72.393	1.565		46.251	.000		
	Total Expense Ratio	-7.512	1.633	-.088	-4.601	<.001	1.000	1.000

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.2.3 Model 2 - Multiple regression model

As there was no significant relationship in the simple regression model conducted for the Swedish market, a multiple regression model was built consisting of additional variables. Due to a multiple regression model being conducted for the Swedish market to examine the significance of the total expense ratio to the 5-year performance to last month, to keep consistency in the study the same multiple regression model was conducted for the U.S. market. The additional variables included in the multiple regression model were the same as for the Swedish market, these being: "tracking error" and "Sharpe ratio".

When including the variables "Sharpe ratio" and "tracking error" one interesting observation, as cam be seen in table 9, was that the adjusted R-square was significantly increased to 0.777 which is a major increase from the simple regression that was conducted to begin with. Hence, the "Sharpe ratio", "tracking error" in addition to the "total expense ratio" can be credited to explain 0,777 of the five-year performance to last month. As the simple regression model previously had signs of significance this test did not contradict previous results from the simple regression model.

Table 6-11. Multiple regression model testing the relationship between the total expense ratio, tracking error, Sharpe ratio and the 5-year performance to last month for the U.S. market

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.882[a]	.777	.777	17.0635288

a. Predictors: (Constant), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Total Expense Ratio, Tracking Error for 5 Years to Last Month End (Fund Currency)

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2741468.454	3	913822.818	3138.516	.000[b]
	Residual	786434.007	2701	291.164		
	Total	3527902.461	2704			

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. Predictors: (Constant), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Total Expense Ratio, Tracking Error for 5 Years to Last Month End (Fund Currency)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-26.294	1.308		-20.101	<.001
	Total Expense Ratio	8.411	.873	.099	9.637	<.001
	Tracking Error for 5 Years to Last Month End (Fund Currency)	5.831	.450	.135	12.963	<.001
	Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	487.005	5.068	.930	96.097	.000

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.2.4 Result of hypothesis-test

The main purpose of this multiple linear regression model for the U.S. market was to answer whether H_{01} could be rejected or not. In tables 9-11 above the empirical result of the regression is presented. H_{01} follows that there is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the U.S. market. As a result of the significance level at <0,001, the null hypothesis can be rejected at a 5% significance level. This indicates that there is a relation between the total expense ratio and the 5-year performance to last month for the sustainable mutual funds on the U.S. market. In table 11 it is shown that the total expense ratio has a positive relationship with the 5-year performance over the last month. This means that an increase in the total expense ratio leads to an increase in the 5-year performance to last month, although the level of explanation for the variable is still considered to be low.

5.2.5 Model diagnostics multiple regression models U.S. market

To ensure that the regression model is accurate and that it can be used to draw correct conclusions, the four requirements stated above must be fulfilled for the multiple regression model as well. The first requirement can be analysed by looking at figure 5 which is set to determine whether the residuals have a linear relationship. A non-linear

relationship can be seen by observing the scatterplot and in this case the residuals can be seen to have an uneven distribution between the plots at the 0,0 mark. This must be achieved in order for the residuals to be confirmed to have a linear relationship, as this requirement is questioned, the first requirement cannot be considered to be fulfilled (Yan & Su, 2009, p.195).

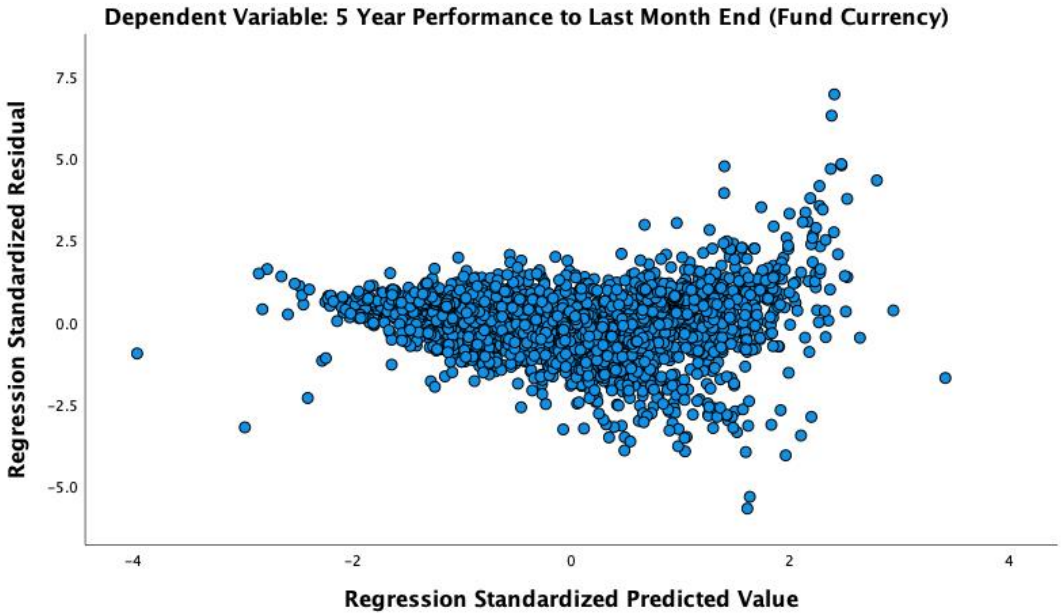


Figure 5. Scatterplot without the WLS weight which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the multiple regression model based on the U.S. market.

Figure 5 is also used to determine whether there is homoscedasticity or heteroscedasticity present in the regression model. In figure 5 a pattern of heteroscedasticity can be detected and thus not confirming the assumption of homoscedasticity. Figure 5 has signs of heteroscedasticity as there seems to be some sort of "cone-formation" in the scatterplot which indicates proof of heteroscedasticity (Studenmund, 2015, p.102-103).

In order to further analyse these issues and confirm whether linearity or homoscedasticity is present, a robust statistical model was built in SPSS. By creating a weighted WLS as a new variable in the data and including PER_1 (Unstandardized Predicted Value) which is based upon previously saved regression analysis, a new regression model can be conducted. The "weight" was constructed by computing a new variable which was done by dividing (1/(PRE_1**2)) with PRE_1 being the Unstandardized Predicted Value, which resulted in the weight.

Thus, to confirm requirement number one and two, a new multiple regression model was conducted also introducing the WLS weight. The new regression model not only confirmed the question of homoscedasticity or heteroscedasticity, but it also significantly increased the adjusted R-square, hence there was a higher degree of explanation when WLS weight was included in the multiple regression model. To construct a new scatterplot with the weighted WLS included, a scatterplot was created through a legacy dialog. The new scatterplot in figure 6, which includes the WLS weight showed no signs of heteroscedasticity, hence it can be confirmed that there is no heteroscedasticity present

in the regression model and residuals, due to this the second requirement can be considered to be fulfilled (Yan & Su, 2009, p.195). Comparing the two scatterplots together, figure 5 which is unweighted and figure 6 which is the latest one with the weight included as a variable it can be noticed how major the difference is. For figure 5 there are signs of heteroscedasticity as there is a pattern of a "cone-formation" whereas for figure 6 the signs are no longer present as there is no pattern of a cone to be found Studenmund, 2015, p.102-103. Hence, it is confirmed that there are no signs of heteroscedasticity when using weighted regression model.

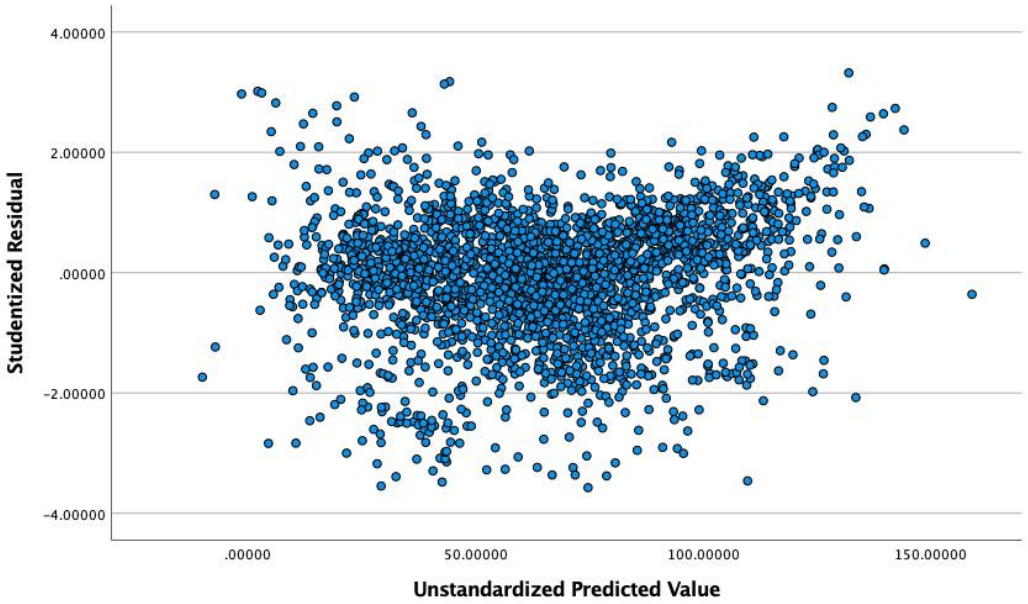


Figure 6. Scatterplot including the WLS weight which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the multiple regression model based on the U.S. market.

Regarding the requirement of normal distribution, figure 7 is used to determine whether there are signs of normal distribution or not. As seen by figure 7 the residual plot seems to follow the linear equation rather straight. There seems to be some deviation in the lower and higher parts of the probability plot, however the deviation seems to be of minimal significance. To further analyse the normal distribution of the residuals for the multiple regression model for the U.S. market figure 8 is used which is a histogram of the residuals. There is a clear sign of normal distribution among the residuals when assessing the histogram in figure 8, hence it can be confirmed by assessing both figure 7 and figure 8 that the residuals for the multiple regression model for the U.S. market are normally distributed and thus confirming that the third requirement is achieved (Yan & Su, 2009, p.195).

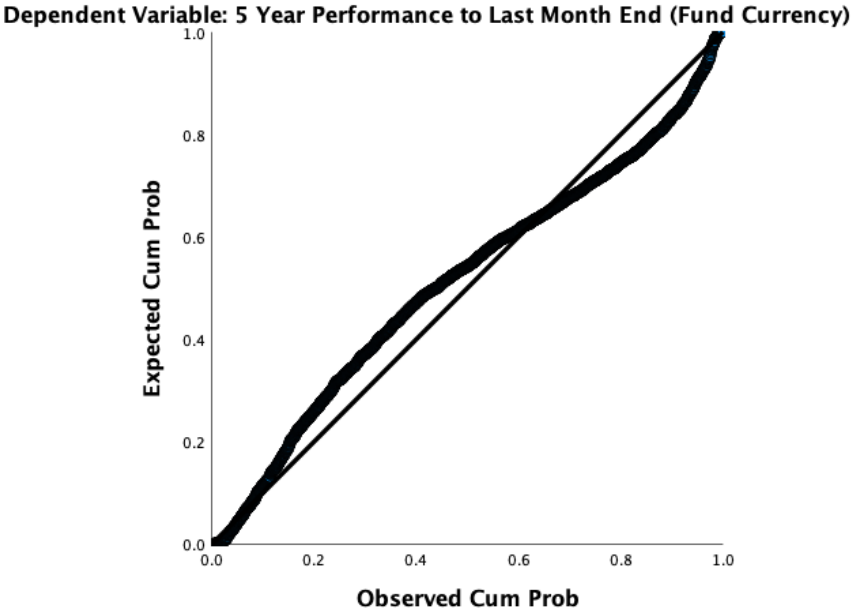


Figure 7. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model based on the U.S. market

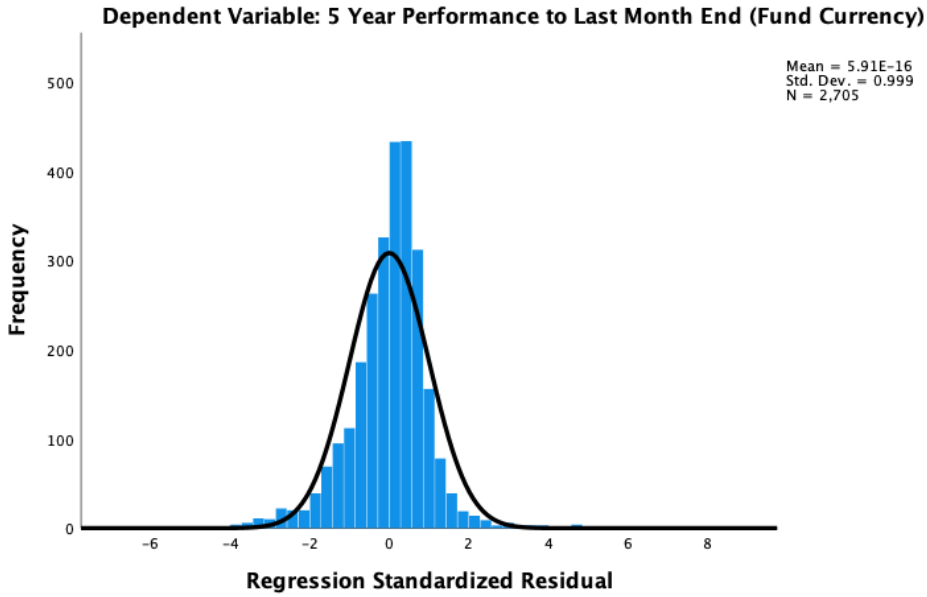


Figure 8. Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model based on the U.S. market

Another approach to examine the normal distribution is by conducting a Shapiro-Wilks test to examine the third requirement. In this case the study gathered a significant p-value of >0,05 as seen in table 12. This would claim that according to the Shapiro-Wilk test that the residuals are not normally distributed. Normal distribution of the residuals is of great importance, but because of the high sample size in this study we cannot simply look at the Shapiro-Wilks test to determine if the data is normally distributed (Gupta et al., 2019, p.70). As there are other methods to investigate normal distribution among the residuals, such as analysing the histogram and normal probability plots of the residuals. The histogram and normal probability plot have already been analysed above; the results displayed that there are signs that the residuals are normally distributed. Due to the histogram and normal probability plots for the residuals showing that the residuals are

normally distributed it can be confirmed that the third requirement is fulfilled despite the Shapiro-wilk displaying contradicting results (Gupta et al., 2019, p.70).

Table 7. Shapiro-Wilk test which is set to determine the normal distribution assumption for the multiple and simple regression model based on the U.S. market

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Total Expense Ratio	.052	3086	<.001	.975	3086	<.001
Tracking Error for 5 Years to Last Month End (Fund Currency)	.101	2705	<.001	.814	2705	<.001
Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	.035	2705	<.001	.994	2705	<.001
5 Year Performance to Last Month End (Fund Currency)	.083	2705	<.001	.959	2705	<.001

a. Lilliefors Significance Correction

To examine whether multicollinearity is present or not the coefficients in table 13 containing "Statistics VIF" are used and tested. The multiple regression model for the U.S. market has no VIF value above 10.000 as seen by table 13, hence it can be concluded that multicollinearity is not present for this multiple regression model.

Table 8. Statistics VIF test which is set to determine if multicollinearity is present or not for the multiple regression model based on the U.S. market

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-26.294	1.308		-20.101	<.001		
	Total Expense Ratio	8.411	.873	.099	9.637	<.001	.787	1.271
	Tracking Error for 5 Years to Last Month End (Fund Currency)	5.831	.450	.135	12.963	<.001	.762	1.312
	Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	487.005	5.068	.930	96.097	.000	.881	1.135

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

As for the Durbin-Watson test the test had a value of 1.989 as seen by table 14. To confirm whether the residuals are independent or not, which it must be for the regression model to be acceptable the value from the Durbin-Watson test had to be as close to the figure 2.00 as possible. Figure 14 indicates that the Durbin-Watson had a value of 1.989, which is enough to accept the assumption that the residuals are independent. The Durbin-Watson is tested to examine the fourth requirement, as explained the value from the Durbin-Watson test is acceptable and thus the fourth requirement can be considered as fulfilled (Yan & Su, 2009, p.195).

Table 9. Durbin-Watson test which is set to determine the independence of the model's residuals for the multiple regression model based on the U.S. market

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.934[a]	.872	.872	1.32637584	1.989

a. Predictors: (Constant), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Tracking Error for 5 Years to Last Month End (Fund Currency), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

c. Weighted Least Squares Regression - Weighted by weight

5.3 Regression model 1 & 2 - Swedish market

Two regression models were conducted for the Swedish market, one simple regression model and one multiple regression model. These models will be presented and explained below. The empirical results of these regression models will be followed by a presentation of the OLS requirements that had to be fulfilled for those models.

5.3.1 Model 3 - Simple regression model

Similarly, to the regression created for the US market, the study first conducted a simple regression model using the Swedish market. With the dependent variable being 5-year performance to last month and total expense ratio as the independent variable. The results from the simple regression model showed a non-significant relation between the variables "total expense ratio" and "five-year performance to last month". The model gave a significant value of 0,975, as showed in table 18. Which is far above the required value for a relation to be called significant on a 95% confidence interval whose required value is >0,05. The adjusted R-square for this simple regression model was -0,004. This is a negative low number that indicates that there is a low negative relation between the two chosen variables and that the total expense ratio cannot be used to explain any variation in the 5-year performance to last month of the chosen mutual funds. Hence, there was cause to further investigate this relationship via a multiple regression model to examine whether the total expense ratio had a significant relationship with the five-year performance to last month.

Table 10-18. Simple regression model testing the relationship between the total expense ratio and the 5-year performance to last month for the Swedish market

Variables Entered/Removed[a]

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

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. All requested variables entered.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.002[a]	.000	-.004	32.7948695

a. Predictors: (Constant), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.084	1	1.084	.001	.975[b]
	Residual	269951.370	251	1075.503		
	Total	269952.453	252			

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. Predictors: (Constant), Total Expense Ratio

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	66.090	4.520		14.622	<.001		
	Total Expense Ratio	.121	3.819	.002	.032	.975	1.000	1.000

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.3.2 Results of hypothesis-test

The main purpose of this simple linear regression model for the Swedish market was to answer whether H_{01} could be rejected or not. In tables 15-18 above the empirical result of the regression is presented. H_{01} follows that there is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the Swedish market. As a result of the significance level at 0,975, the null hypothesis cannot be rejected at a 5% significance level. This indicates that there is no relation between the total expense ratio and 5-year performance to last month on the Swedish market.

5.3.2 Model diagnostic simple regression

As there was no significant relation between the 5-year performance to last month and the total expense ratio it was even more important to analyse the residuals and ensure that the requirements were met. This was done in the same approach as previous model diagnostics, firstly figure 9 was assessed to determine whether their residuals had a linear relationship, as seen by figure 9 it seems like there is an equal distribution of plots on both sides of the 0.00 line. Hence, it can be assumed that the residuals have a linear relationship, and the first requirement is considered as fulfilled (Yan & Su, 2009, p.195).

To confirm the requirement regarding the residual's homoscedasticity, the study visually analysed the scatterplot on figure 9 to determine the shape of the residuals. As seen in the scatterplot no specific pattern can be seen. This would imply that the model does not

suffer from heteroscedasticity and therefore the assumptions about constant variance could be deemed to be fulfilled and the second requirement could hence be confirmed to be fulfilled (Yan & Su, 2009, p.195).

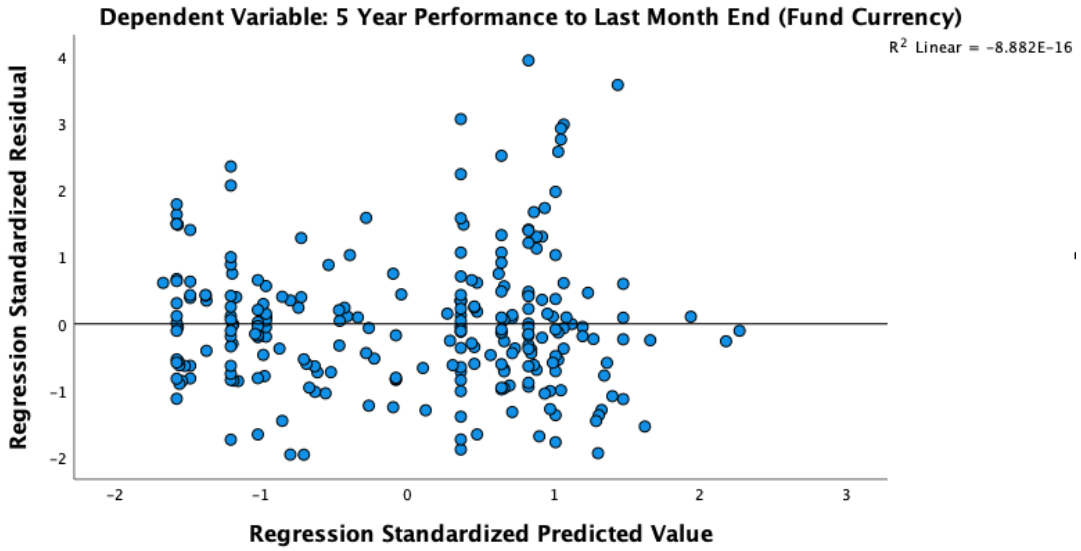


Figure 9. Scatterplot which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the simple regression model for the Swedish market

Figure 10 confirms that the residuals are normally distributed as the residuals do not have any major deviation from the linear equation, although some small deviation can be noticed in the middle for the residuals. To continue the residual analysis, figure 11 which displays the histogram was analysed. The histogram, just as the P-P plot is set to determine whether the residuals are normally distributed or not. As perceived by figure 11 it can be determined that the residuals for the simple regression model for the Swedish market are normally distributed. Thus, by using both figures the residuals can be confirmed to be normally distributed and the third requirement is hence considered as fulfilled (Yan & Su, 2009, p.195).

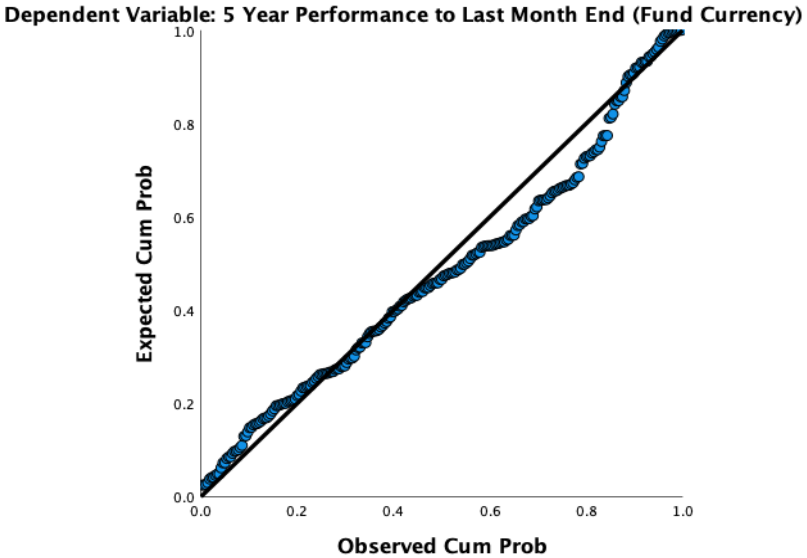


Figure 10. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the simple regression model based on the Swedish market

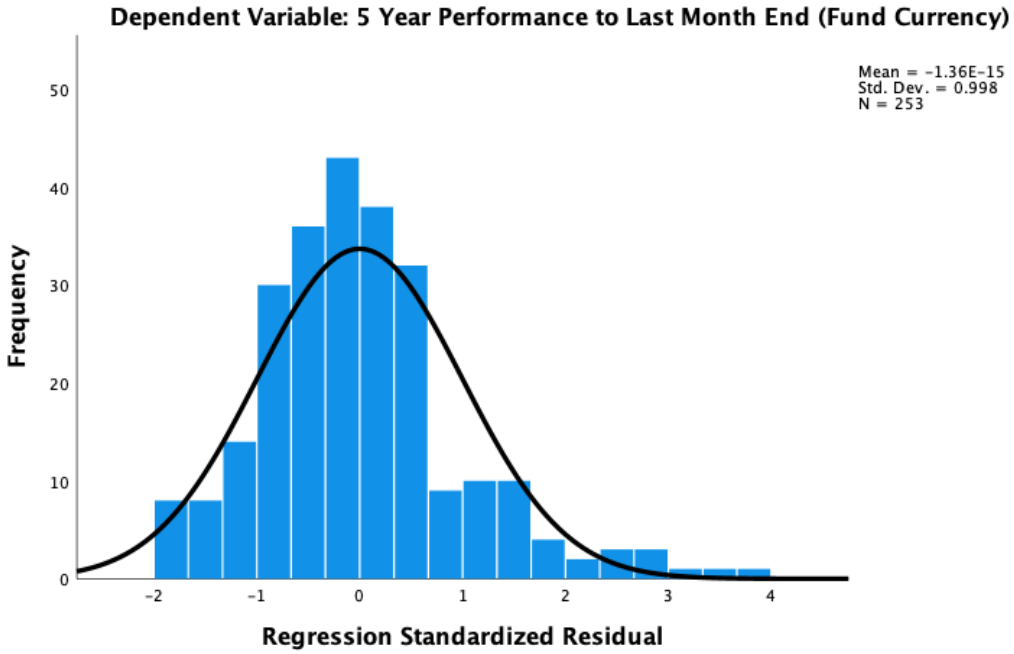


Figure 11. Histogram which is set to determine the normal distribution regarding the residuals from the simple regression model based on the Swedish market

To examine whether multicollinearity is present or not, table 19 was examined. The multiple regression model for the Swedish market has no VIF value above 10.000 as seen by table 19 where the VIF value for the TER is 1.000, hence it can be concluded that multicollinearity is not present for this multiple regression model.

Table 11. Statistics VIF test which is set to determine if multicollinearity is present or not for the simple regression model based on the Swedish market

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	66.090	4.520		14.622	<.001		
	Total Expense Ratio	.121	3.819	.002	.032	.975	1.000	1.000

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

As for the Durbin-Watson test the test had a value of 0.692 as seen by table 20, hence it cannot be assumed that there is no autocorrelation between the residuals. To confirm whether the residuals are independent or not, which it must be in order for the regression model to be acceptable the value from the Durbin-Watson test had to be as close to the figure 2.00 as possible. Table 20 indicates that the Durbin-Watson had a value of 0.602, which is not enough to accept the assumption that the residuals are independent. However, as previously mentioned the simple regression model conducted for the Swedish market did not give any significant results and have since been dismissed, therefore the value of the Durbin-Watson test is of no significance.

Table 12. Durbin-Watson test which is set to determine the independence of the model's residuals for the simple regression model based on the Swedish market

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin–Watson
1	.002[a]	.000	-.004	32.7948695	.602

a. Predictors: (Constant), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.3.3 Model 4 - Multiple regression model

Due to the low significant value gathered in the simple regression model, the study continued to conduct a multiple regression model with two additional variables "Sharpe ratio" and "tracking error". This was primarily done to examine whether the total expense ratio had a significant relationship to the 5-year performance to last month. By conducting a multiple regression model for the Swedish market using additional variables, the relationship between the total expense ratio and the 5-year performance to last month could be tested once more to evaluate the possible significant relationship. When conducting a multiple regression model, it was observed that the question regarding a significant relationship between the total expense ratio and the 5-year performance to last month for the Swedish market was met as seen in table 23. Furthermore, it was observed that when conducting a multiple regression model using the "tracking error" and "Sharpe ratio" the degree of explanation was significantly increased. Table 21 showed a noticeable improvement in the adjusted R-square value with an increased value of 0,708 (70,8% degree of explanation of the variation in the dependent variable). While conducting the multiple regression model it became apparent that the "Sharpe ratio" had the greatest impact and influence over the model's adjusted R-square value. Overall, though, all the independent variables showed significant values, including the "total expense ratio" which gave a significant value of 0,012.

Table 13-23. Multiple regression model testing the relationship between the total expense ratio, the tracking error, the Sharpe ratio and the 5-year performance to last month for the Swedish market.

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.843[a]	.711	.708	17.6979092

a. Predictors: (Constant), Tracking Error for 5 Years to Last Month End (Fund Currency), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	191961.672	3	63987.224	204.291	<.001[b]
	Residual	77990.781	249	313.216		
	Total	269952.453	252			

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

b. Predictors: (Constant), Tracking Error for 5 Years to Last Month End (Fund Currency), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Total Expense Ratio

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-28.955	4.596		-6.300	<.001		
	Total Expense Ratio	5.448	2.159	.090	2.524	.012	.911	1.097
	Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	420.546	17.626	.828	23.859	<.001	.964	1.038
	Tracking Error for 5 Years to Last Month End (Fund Currency)	4.875	1.372	.126	3.553	<.001	.924	1.082

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.3.4 Result of hypothesis-test

The main purpose of the multiple linear regression model for the Swedish market was to answer whether H_{02} could be rejected or not. In tables 21-23 above the empirical result of the regression is presented. H_{02} follows that there is no significant relation between the total expense ratio and the 5-year performance to last month for sustainable mutual funds in the Swedish market. As a result of the significance level at 0,012, the null hypothesis can be rejected at a 5% significance level. This indicates that there is a relation between the total expense ratio and the 5-year performance to last month. Table 23 shows that there is a positive relation between the variables. Which in turn means that an increase in the total expense ratio leads to an increase in the 5-year performance to last month.

5.3.5 Model diagnostic multiple regression

The analysis of the residuals in the multiple regression model for the Swedish market was done in the same way as for previous residuals for the previous regression models. First per usual the linear relationship between the residuals was determined by observing figure 12, there is an equal distribution of plots across the line that stretches from the value 0.00. Hence, it can be confirmed that the assumption of a linear relationship between the residuals is granted, and the first requirement is thus considered as fulfilled (Yan & Su, 2009, p.195).

To determine whether homoscedasticity or heteroscedasticity is present, the scatterplot from figure 12 was used once more. The figure shows some signs of heteroscedasticity as there are some visible signs of a “cone-formation” in the scatterplot. However, in order to further analyse this, a new regression model was built in SPSS. A new variable was

created called “WLS Weight” which was created by including PER_1 (Unstandardized Predicted Value) which is based upon previously saved regression analysis. The weight variable was built by computing a new variable via SPSS, it was done by dividing (1/(PRE_1**).

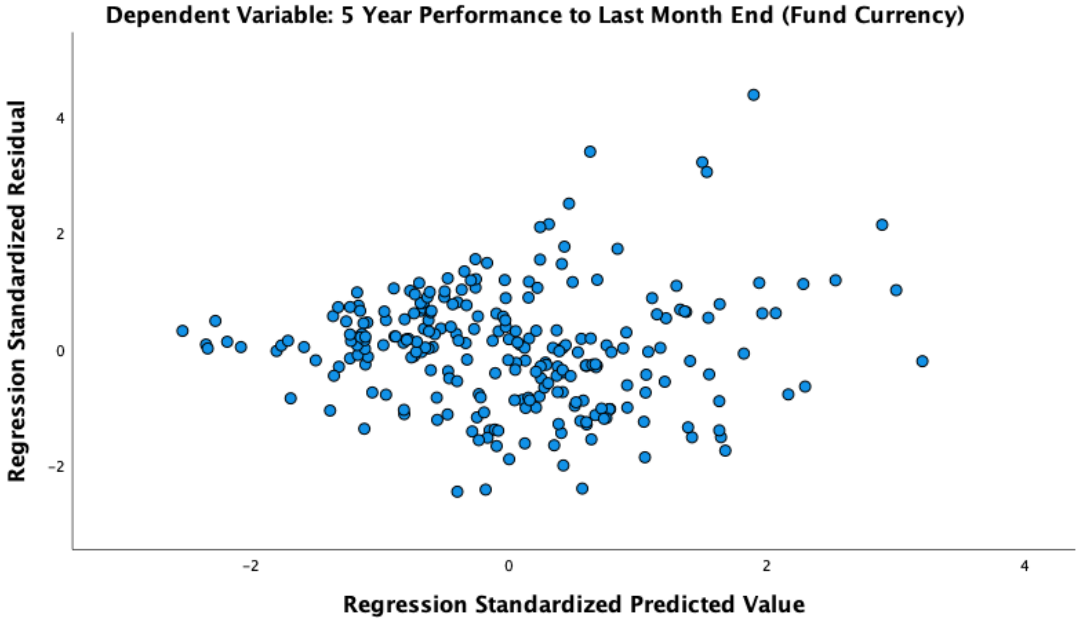


Figure 12. Scatterplot without the WLS weight which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the multiple regression model based on the Swedish market

To confirm whether homoscedasticity or heteroscedasticity was present, a new regression model was conducted which included the new variable weight. Via the new regression model a new scatterplot could be created through a legacy dialog. The new scatterplot which includes the weight is shown in figure 13, there are no signs of heteroscedasticity in the new scatterplot created. As from Studenmund (2015, p.102-103), a “cone-formation” is a sign of heteroscedasticity, which is a sign not present when including the weight. Hence, it can now be confirmed that heteroscedasticity is not present in the multiple regression model when using the weight as an additional variable. However, to further confirm this a Breusch-Pagan test should be conducted to further prove that the assumptions are valid, however due to lack of time and no available Breusch-Pagan test through SPSS the decision was taken to base the decision of no heteroscedasticity via figure 13. Due to the above, the second requirement was considered to be met (Yan & Su, 2009, p.195).

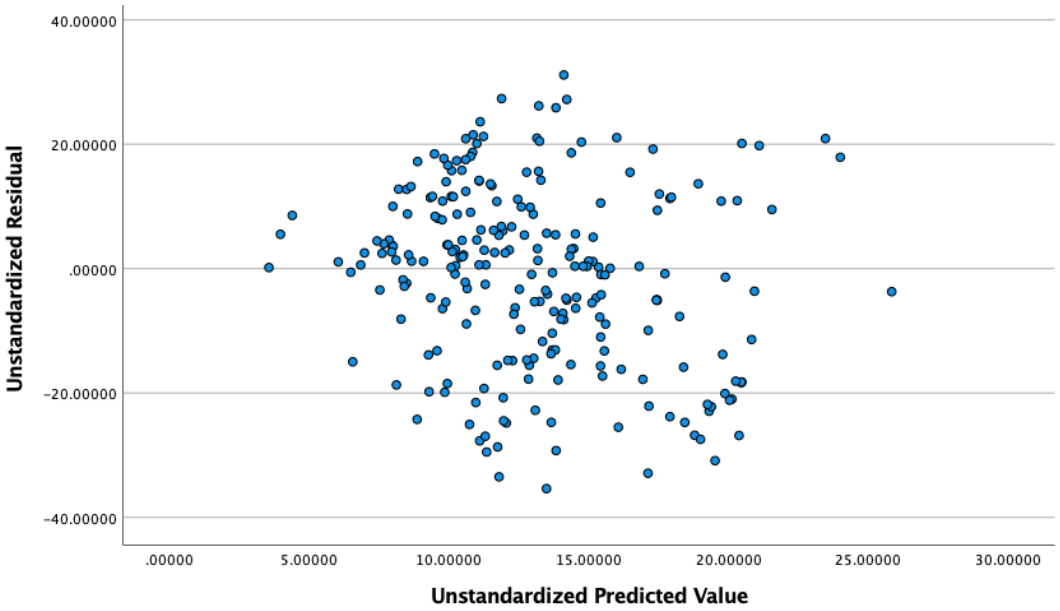


Figure 13. Scatterplot without the WLS weight which is set to determine the linear relationship for the residuals as well as detecting if homoscedasticity or heteroscedasticity is present for the multiple regression model based on the Swedish market.

Table 24 has been examined to determine whether multicollinearity is present in the multiple regression model for the Swedish market or not. As confirmed earlier in the study the VIF value must be below 10 in order to confirm that multicollinearity is not present, in this case the VIF is below 10 for all variables. Hence, it is confirmed that multicollinearity is not present for the multiple regression model for the Swedish market.

Table 14. Statistics VIF-test which is set to determine if multicollinearity is present or not for the multiple regression model for the Swedish market

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-28.955	4.596		-6.300	<.001		
	Total Expense Ratio	5.448	2.159	.090	2.524	.012	.911	1.097
	Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	420.546	17.626	.828	23.859	<.001	.964	1.038
	Tracking Error for 5 Years to Last Month End (Fund Currency)	4.875	1.372	.126	3.553	<.001	.924	1.082

a. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

To further analyse the residuals and confirm the assumptions of normal distribution figure 14 was observed to understand whether the residuals were normally distributed or not. It can be detected that the residuals are following the linear equation relatively well, and no major deviation is to be detected. To further analyse the requirement of normal distribution figure 15 was analysed, as seen by figure 15 the residuals can be assumed to be normally distributed. Hence, it can be confirmed that the third requirement is fully met (Yan & Su, 2009, p.195).

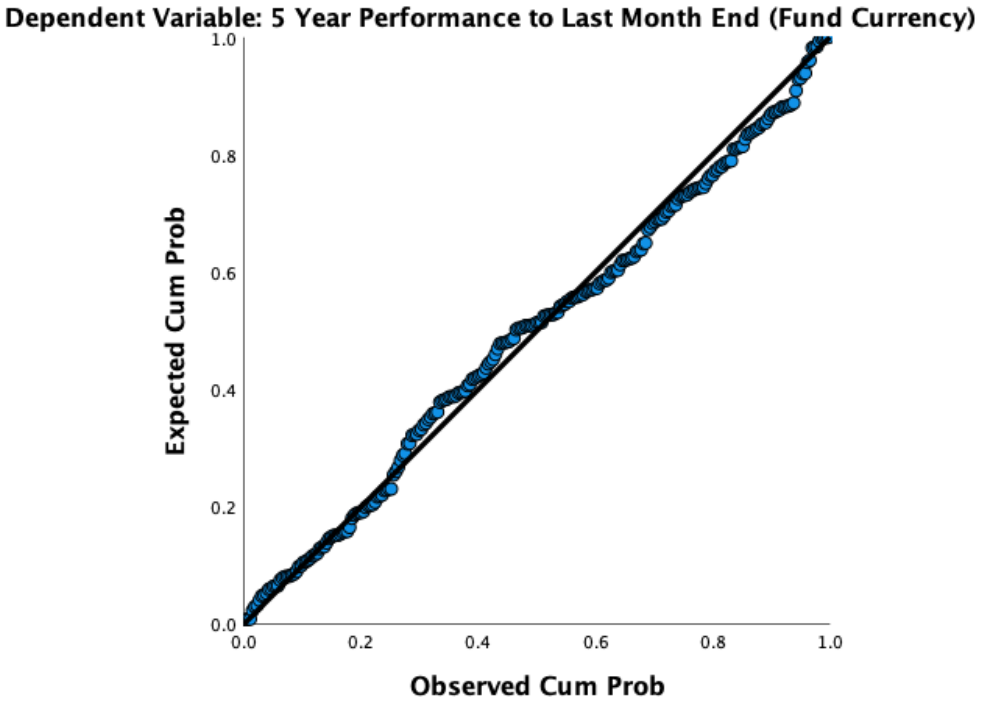


Figure 14. Normal probability plot of regression which is set to determine the normal distribution of the residuals for the multiple regression model based on the Swedish market

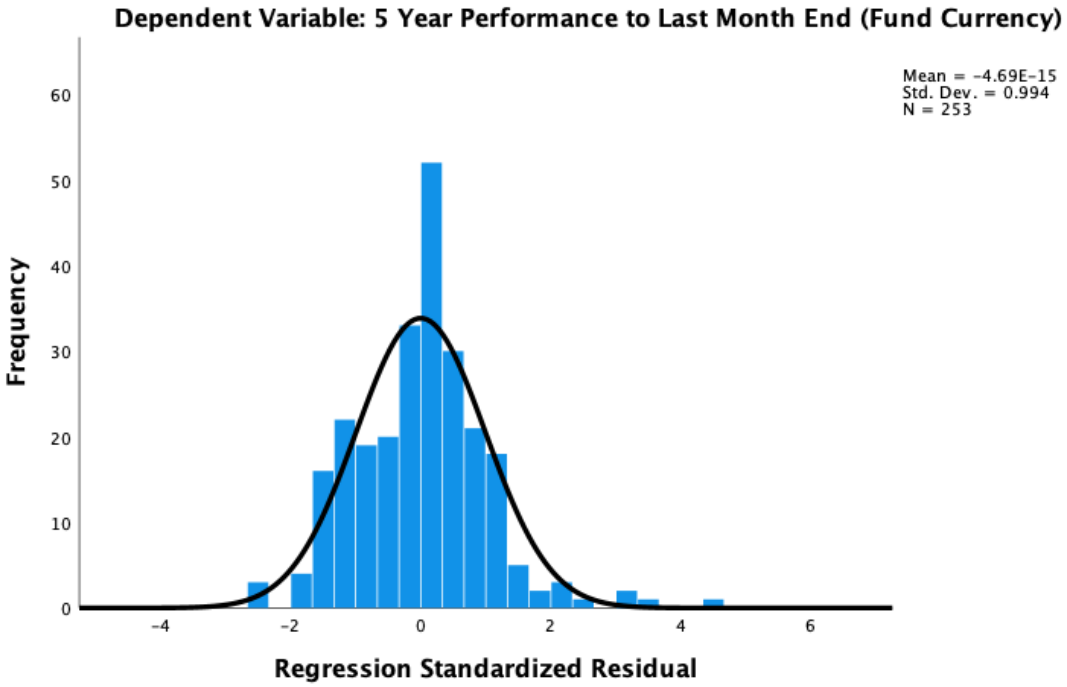


Figure 15. Histogram which is set to determine the normal distribution regarding the residuals from the multiple regression model based on the Swedish market

The Shapiro-Wilk test was conducted once for both regression models regarding the Swedish market. The Shapiro-Wilk test is used to determine whether the regression models follow the assumptions of normal distribution. As seen in table 25, the p-value for the 5-year performance to last month, the total expense ratio as well as the tracking error

for 5 years to last month all have a p-value <0.05. Thus, according to the Shapiro-Wilk requirements, the residuals for these variables cannot be seen as normally distributed. However, due to the large sample size the Shapiro-Wilk test cannot be the single decisive source (Gupta et al., 2019, p.70). Due to the large sample size the Shapiro-Wilk test cannot be guaranteed to be used correctly and hence the decision has been taken to use the other figures that showed signs of normal distribution among the residuals (Gupta et al., 2019, p.70).

As the histogram as well as the probability plot both have signs of normal distribution the decision has been taken that there are enough signs of normal distribution to determine that the residuals are normally distributed. Regarding specifically the Sharpe ratio for 5 years to last month the p-value is >0.05, hence there are signs that these variable residuals are normally distributed as determined by the Shapiro-Wilk test.

Table 15. Shapiro-Wilk test which is set to determine the normal distribution assumption for the multiple and simple regression model based on the Swedish market

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
5 Year Performance to Last Month End (Fund Currency)	.101	253	<.001	.948	253	<.001
Total Expense Ratio	.179	253	<.001	.919	253	<.001
Tracking Error for 5 Years to Last Month End (Fund Currency)	.147	253	<.001	.859	253	<.001
Sharpe Ratio for 5 Years to Last Month End (Fund Currency)	.069	253	.005	.991	253	.125

a. Lilliefors Significance Correction

As seen by table 26, the value for the conducted Durbin-Watson test is at 1.949, as previously said the Durbin-Watson test is conducted to detect whether the residuals are independent or not, which it must be in order for the regression model to be acceptable. The value from the Durbin-Watson test had to be as close to the figure 2.00 as possible. Table 26 indicates that the Durbin-Watson had a value of 1.949, which is enough to accept the assumption that the residuals are independent. Thus, the fourth requirement regarding the residuals to be independent is considered as fully met (Yan & Su, 2009, p.195).

Table 16. Durbin-Watson test which is set to determine the independence of the multiple regression model based on the Swedish market

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.843[a]	.711	.708	17.6979092	1.949

a. Predictors: (Constant), Sharpe Ratio for 5 Years to Last Month End (Fund Currency), Tracking Error for 5 Years to Last Month End (Fund Currency), Total Expense Ratio

b. Dependent Variable: 5 Year Performance to Last Month End (Fund Currency)

5.4 The final regression models for the U.S. and Swedish market

To fulfill the requirements needed to ensure a stable regression model as stated in chapter 5.1, The multiple regression models had to be weighted.

These were the final regression models used in this thesis:

Simple linear regression (model 1 & 3):

yi = β0 + β1 * total expense ratio + εi

Multiple regression model (model 2 & 4)

yi_w = β0 + β1 * total expense ratio + β2 * tracking error + β3 * sharpe-ratio + εi

6. Analysis & Discussion

This chapter will discuss the empirical results discovered in the fourth chapter. The chapter will begin with a summary of the regression models and follow-up with connecting existing research to the studies discoveries.

6.1 Analysis of regression models

The statistical tests conducted in this study have led to many interesting observations. The main area of investigation for this study has been to discover if there is a relationship between the total expense ratio and the 5-year performance to last month when it comes to sustainable mutual funds registered in Sweden and the United States. In other words, if the total expense ratio is reflected in the return of the sustainable mutual funds. While previous studies and articles have studied the relationship between the return for mutual funds and the fees, this study has further analysed this subject by studying specifically sustainable mutual funds and comparing these to two different domiciles.

When it comes to the relationship between the total expense ratio and the 5-year performance to last month on the Swedish market for the sustainable mutual funds studied, the simple regression model showed there to be no relation between them. The degree of explanation was very low as well as it was discovered to be -0.004. However, due to there being no significant relation between the variables, the degree of explanation is not relevant to further analyse. Hence, due to this it cannot be confirmed that solely the total expense ratio is an explanatory variable for the 5-year return to last month for sustainable mutual funds registered in Sweden.

As there was no significant relationship discovered between the total expense ratio and the 5-year performance to last month for the in the simple regression model for the Swedish market, a multiple regression model was built. This was done to assess whether a significant relationship between these two variables could be presented. When including additional control variables (sharpe ratio and tracking error), for the multiple regression model, it was immediately noticed that the relationship between the total expense ratio and the 5-year performance to last month displayed a significant relation. Hence, due to the multiple regression model displaying a significant relation, it could be determined that with the help of control variables the total expense ratio showed a low degree of explanation towards the 5-year performance to last month. Furthermore, the degree of explanation was significantly increased due to the two additional control variables in the regression model, the degree of explanation was increased to 0.708.

The simple regression model conducted for the U.S. market showed a significant relation between the total expense ratio and the 5-year performance to last month. However, the model had a very low degree of explanation with an adjusted R-square of 0.007. Although the degree of explanation in the model is considered as very low, the significant result still indicates that there is a relation between the total expense ratio and the 5-year performance for the U.S. market. Hence, the 5-year performance to last month for sustainable mutual funds in the U.S. market can to a minimal extent be explained by the variation in the total expense ratio.

As a multiple regression model was conducted for the Swedish market, the same had to be executed for the U.S. market to keep consistency and comparability between the two markets. When conducting the multiple regression model the results displayed, as for the simple regression model, a significant relation between the total expense ratio and the 5-

year performance to last month. Additionally, it was discovered that the degree of explanation was significantly increased to 0.777, this however can be explained by the two control variables chosen, the tracking error and the sharpe ratio.

One of the variables included in the multiple regression models was as mentioned the Sharpe ratio. The Sharpe ratio is an interesting measurement to evaluate sustainable mutual funds' performance in relation to their risk-taking. Several interesting observations were also made regarding the relationship between the mutual funds ESG-score and Sharpe ratio. This study showed that, in general, the sustainable mutual funds with an average ESG- rating of (>65) also were the sustainable mutual funds with a higher Sharpe ratio. This would indicate that mutual funds that take increased risks in ESG friendly ventures are rewarded with a higher degree of return than their counterparts who invest and take risks in lesser ESG focused industries/companies.

Contrary to the Sharpe ratio, where a higher Sharpe ratio for most parts had a high ESG score, the *tracking error* does not follow the same relationship. When analysing the tracking error in comparison to the ESG score, it could be established that the observations with a high tracking error also had an ESG score at the lower tiers. Thus, a lower ESG rating would in turn give a higher tracking error, which would assume that lower ESG rated mutual funds are the ones who are more actively managed in comparison to the high rated ESG mutual funds where the tracking error is lower (Cremers & Petajisto, 2009). It can be discussed whether high ESG rated mutual funds can be considered as more passively managed than actively managed as these often have a higher tracking error in which this study has shown, has a low ESG rating. In short, the tracking error as explained previously can be used as a tool to determine whether the sustainable mutual funds are passively or actively managed. As noticed in the data collection, the high ESG rated sustainable mutual funds tended to have a low tracking error which is an indication that the sustainable mutual fund in question is passively managed. While low rated ESG sustainable mutual funds tended to have a tracking error with a larger value, indicating that these could be considered as actively managed.

One possible explanation to why there was no significant relationship between the 5-year performance to last month and the total expense ratio could be the sample size. The number of Swedish registered mutual funds was 786 whilst the number of U.S. registered mutual funds added up to a total of 7094. The study did increase the sample size to conduct a regression model with a larger sample size as the sample selection was lowered to an ESG score with ≥50 instead of ≥75. However, the limit of ≥50 could not be stretched any further as it would be difficult to argue that any mutual funds with an ESG below >50 can be considered as sustainable. Thus, the limit was set at 50. However, even with a sample size using an ESG score of ≥50 the results seemed to be insignificant, thus, to test the relationship and to find significant relationships the sample size could have been increased further, but as mentioned earlier this was not possible to do in this case.

As both multiple regression models were significant with a high degree of explanation, it can be confirmed that for both the Swedish and the U.S. market, the markets' 5-year performance to last month for sustainable mutual funds can be explained by the total expense ratio. There was no major difference between the adjusted R-square between the multiple regression models in the two different markets. The adjusted R-square for the Swedish market was calculated at 0,708 while it was calculated at 0,777 for the U.S. market. Hence, taking this into consideration it can be concluded that the U.S. market has

a higher degree of explanation regarding the 5-year performance when conducting a multiple regression model.

It can hence be concluded that for investors looking to understand the relation regarding the 5-year performance to last month it is found to have a higher degree of explanation for the U.S. market than it can for the Swedish market. However, both markets have a rather high degree of explanation when using the multiple regression models. The study conducted regression models to understand whether a simple regression model with the total expense ratio as a single variable could explain the 5-year performance to date. However, the results were not significant for the Swedish market and had a low negative relationship whilst the U.S. market had a significant result but a low degree of explanation as well. Thus, to explain the 5-year performance to last month for both markets more variables must be included.

Overall, the results regarding the simple regression model do align with previous studies where Otten & Bams (2002) is an example which studied the relationship between the performance of mutual funds and their characteristics. The results discovered a negative relationship between the total expense ratio and the risk-adjusted performance of mutual funds. The results from Otten & Bams (2002) are equivalent with the results discovered from the simple regression model conducted for the U.S. market where a negative relationship was discovered between the 5-year performance to last month and the total expense ratio with a B coefficient with -7.512. This suggests that when the total expense ratio is increased by 1 the performance for a sustainable mutual funds in the U.S. market is lowered by -7.512. This would assume that the total expense ratio has a negative relation to the 5-year performance to last month, where increasing total expense ratio would lower the performance.

Furthermore, the Swedish market had a positive B coefficient with a value of 0.121. However, due to the results being insignificant for this simple linear regression, it cannot be statistically proven that the results are correct and be used to draw conclusions about the Swedish market and the relationship between the 5-year performance and the total expense ratio. As of this, the results from the U.S. market are the only simple regression model which had a negative relationship between the 5-year performance and the total expense ratio, aligned with results from previous studies. Therefore, it can be said that the relationship between the 5-year performance and the total expense ratio for sustainable mutual funds are in line with the relationship for traditional mutual funds for sustainable mutual funds registered in the United States.

Previous studies done by (Garmhausen, 2011; Tandon & Singh, 2021) have also found there to be no significant relation between expense ratio and mutual fund performance. Hence, as there was no significant relationship when conducting a simple regression model for the Swedish market the results situate themselves with the results discovered in the studies conducted by the researchers stated above. Thus, the result on the Swedish markets simple regression model can be provided with the backing of previous studies.

As for the multiple regression models, the B coefficient regarding the total expense ratio for the Swedish multiple regression model was 5.448, whilst it was 8.411 for the U.S. market. Hence this indicates that there is a positive relationship between the 5-year performance for sustainable mutual funds and the total expense ratio when conducting a multiple regression model. When comparing the results between the two markets, based

on the multiple regression models, the B coefficients do not show any major differences between the markets. This indicates that sustainable mutual funds on both the Swedish and U.S. market react in a similarly positive way to an increase in the total expense ratio. This is an interesting observation, due to the fact that the result is in line with our previous assumption regarding the *effective market hypothesis*. This supports the notion that no perfect market exists and that an increase in the total expense ratio could be justified by an increase in mutual fund return. The similar level of a significant relationship between increased performance in relation to the total expense ratio between the two markets could be explained by a few reasons mentioned earlier in the text. The two markets follow similar financial regulations, they are based on the same economic system, and the two countries are highly regarded in terms of sustainability policies. in relation to a global setting. An interesting observation is that the U.S. market shows a slightly higher increase in financial performance in relation to an increase in the total expense ratio than the Swedish market. This indicates that investors in the U.S. market could receive a higher return than investors in the Swedish market by investing their money into sustainable mutual funds with a higher total expense ratio. One possible explanation for this is due to the findings by (Berkowitz & Kotowitz, 2002, p.328), where the authors stated that certain "high-quality" managers could charge a higher fee based on their performance. Due to the higher selection pool of U.S. fund managers, a higher percentile of these "high-quality" managers could be present as fund managers of U.S. domicile funds and skew the result in favor of U.S. fund managers. Hence, it could explain the increase in performance when the total expense ratio is increased by 1.

However, it must be highlighted that the degree of explanation is very low for the U.S. market when conducting a simple regression model, hence the B coefficient must be used with caution due to the low degree of explanations. For the multiple regression models conducted for both markets, the control variables undoubtedly increase the degree of explanation immensely, thus it can be understood that the control variables have a large impact on the regression models and their explanations. This further indicates to use the B coefficients for the total expense ratio and the 5-year performance with caution when analysing the multiple regressions.

The focus in this study has been towards the performance of sustainable mutual funds and to find explanatory variables to the total performance. Although the *tracking error* has been taken into consideration the focus has not been put towards the management (*active or passive*) of the sustainable mutual funds. However, as the tracking error is used as a variable which in turn can be used as a tool to detect whether the sustainable mutual funds are actively or passively managed the *EMH* must be further described. According to the EMH, *actively managed* mutual funds should have a hard time to manage to outperform the market, furthermore, *actively managed* mutual funds are relatively more expensive than *passively managed* mutual funds (Jones & Wermers, 2011, p.30-31). A central part of the efficient market theory is based upon the *random walk theory* in which the theory states that share prices are random and are not predictable (Bodie et al., 2011, p.372). With this taken into consideration according to the EMH the selected sustainable mutual funds in the screener with the lowest tracking error should have the better performance in relation to the *total expense ratio*. The value of the *tracking error* can determine whether the selected sustainable mutual funds are *actively* or *passively* managed. There is no possible way to acquire a gain by recognizing any overvalued or undervalued stocks (Hård af Segerstad & Pettersson, 2016, p.11). Hence, according to the EMH, *actively managed* mutual funds should have a hard time to manage to outperform the market.

This study did not find any signs that this assumption is true, although this was not the focus and no actual simple regression model regarding total performance to the tracking error was conducted. With this said, this study does not assume that the EMH is assumed, as there were no signs that *passively* managed mutual funds outperform actively managed funds for a lower fee (Jones & Wermers, 2011, p.30-31). If EMH was in place evidently the sustainable mutual funds with the lowest *tracking error* should outperform the sustainable mutual funds with a higher *tracking error*. Yet, this was not discovered when conducting the regression models and studying the collected data. Furthermore, the discussion whether investors act *rational*, or *irrational* is well discussed, however the consensus over the recent years is that no perfect market exists and that investors act irrationally independent of the information they possess. This study thus adapts to the assumption which the consensus assumes, investors act *irrational*. This is further supported by the fact that if EMH is assumed, it is subsequently assumed that investors act rational (Fama, 1965), as this study does not assume that EMH is present it will subsequently not assume that investors in general act *rational*. This assumption depends on external factors, asymmetric information etc., but based on solely theory it is assumed that investors act irrationally.

As always when it comes to evaluating mutual funds in regard to financial performance, it is important to take survivorship bias into consideration. Low performing mutual funds can in many cases be merged into other mutual funds that are managed by the same investing company (Rohleder et al., 2010, p. 441; Elton et al., 1996, p. 1098). This will in turn lead to misleading conclusions about the mutual fund portfolios as only the mutual funds that have survived during a long period of time will be accounted for when it comes to average out the performance over a longer period (Rohleder et al., 2010, p. 441; Elton et al., 1996, p. 1098). Due to the large sample sizes in this study, especially the U.S. registered sustainable mutual funds, survivorship bias can be hard to avoid due to the large amount of data points to consider. The study has therefore relied on the database managers to correctly showcase the appropriate mutual funds to hopefully mitigate the consequences of survivorship bias. This issue could however require more effort to mitigate potential risks associated with survivorship, and in the future, further steps to handle this issue could be implemented.

The study set out to clarify if there was a relationship between the total expense ratio and the financial performance over the last 5 years. As elaborated upon earlier in the study, the relation between the total expense ratio and the financial performance over the last 5 years to last month showed a significant relationship in three out of the four regression models. However, in the simple regression models, the degree of explanation can be considered to be very low. This would indicate that there are other variables that have a more significant impact on the return, rather than the total expense ratio. Some potentially relevant variables could be “Years Since Registration”, ``Asset Under Management (AUM)” and “Net Asset Value (NAV)”. These are variables that previous studies have looked at in regard to their relation to the return of conventional mutual funds (Singh & Tandon, 2021). As the results indicate that a higher total expense ratio has a relationship with the performance of the sustainable mutual fund. Investors could take this into consideration and see fund managers as an asset to the sustainable mutual fund and its performance. By contributing and expanding on the literature in sustainable finance, a larger pool of investors may enter the sector and increase the cash flow into these sustainable mutual funds. Which in turn could have an impact regarding minimizing the

effects of bad practices on the behalf of companies. As an increase in cash flow towards sustainable mutual funds would benefit companies that focuses their operations on social and environmental sustainability.

7. Conclusion & suggestions for future research

In this study's final chapter, a short presentation is conducted consisting of the final conclusions drawn from the gathered results. Following the first section, a second section consisting of truth criterias, ethical principles and general implications are presented. Lastly, a third section consisting of suggestions towards future research are listed by the authors.

7.1 Conclusion

After completing the data collection, compiling, and processing the data through regression models it can be concluded that a significant relation was found in three out of four regression models between the total expense ratio and the financial performance over the last 5 years to last month. Unfortunately, the simple regression model for the Swedish market did not have a significant relation and the results have since been dismissed and a multiple regression model was conducted. As for both conducted multiple regression models, the total expense ratio had a positive relation to the 5-year financial performance to last month. Which means that an increase in the total expense ratio leads to a subsequent increase in the financial performance over the last five years. However, this result was not replicated when conducting the simple regression models for the U.S. market, as the U.S. market had a negative relationship. Which in context would assume that an increase in the total expense ratio would decrease the performance of the sustainable mutual fund in question. These differentiating results could be derived from the relationship between the independent variables in the multiple regression analysis.

In regard to answering the study's research question, if there is a relation between the total expense ratio and the return on sustainable mutual funds in the U.S. and Swedish market, the results in the simple regression model for the Swedish market showed that there were no significant relationship between the two variables. However, in the U.S. market a significant relationship was found between the total expense ratio and the 5-year performance to last month when conducting a simple regression model. The significant relationship between the total expense ratio and the 5-year performance to last month was replicated in the multiple regression models for both markets. Thus, there is evidence that there is a significant relationship between the total expense ratio and the 5-year performance to last month for the Swedish market as well as the U.S. market.

In the introduction section of the paper previous studies were presented where the results indicated that there was no relation between the total expense ratio and the return of the mutual fund (Garmhausen, 2011; Tandon & Singh, 2021; Burton, 2013). These results were about conventional mutual funds with no orientation towards sustainability. However, the simple regression model for the Swedish market did in fact discover similar results as there was no significant relationship between the two variables. Hence, the results from the simple regression model for the Swedish market can corroborate with the results found by the authors of the previous studies. This indicates that there is no value in paying a higher fee for supposed expertise and return when it comes to sustainable mutual funds in the Swedish market. In turn this also suggests that there is no inherent value in knowledge in regard to sustainable practices and patents. The results presented in this study regarding the Swedish market and the simple regression, further strengthens the theory regarding *random walk theory* (Bodie et al., 2011, p.372) in saying that the stock market is impossible to predict, and that managerial expertise is not worth paying a larger management fee for.

By drawing conclusions from the simple regression model conducted for the Swedish market it can be said that the results contribute and provides private investors as well as sustainable mutual fund managers. The contribution is that the total expense ratio has no significant relationship to the performance of sustainable mutual funds and hence the total expense ratio has no relevancy to the performance of sustainable mutual funds for the Swedish market. These results have to be considered with caution due to the lack of significant relationship between the variables.

Regarding the multiple regression model for the Swedish market, there was a significant relationship found. The main conclusion drawn from this multiple regression model is that the total expense ratio does in fact have an impact on the 5-year performance to last month for sustainable mutual funds in the Swedish market. Hence, mutual fund managers and private investors should be aware that the total expense ratio to some extent can explain the performance of sustainable mutual funds in the Swedish market. The change in conclusion can be explained by the help of the control variables, Sharpe ratio and Tracking error.

Regarding the U.S. market, the two regression models conducted had similar results as both regression models showed a significant relationship between the total expense ratio and the 5-year performance to last month. Hence, the conclusions derived from the U.S. markets regressions models is that the total expense ratio does in fact have a relationship to the 5-year performance of last month for sustainable mutual funds. Thus, mutual fund managers and private investors must be aware that the total expense ratio to some extent can explain the performance of sustainable mutual funds in the U.S. market.

The purpose of this study was to examine whether a relationship between the total expense ratio and the 5-year performance to last month for the U.S. market and the Swedish market could be confirmed as the research question was stated as followed: *Is there a relationship between the return on sustainable mutual funds and the total expense ratio within the US market and the Swedish market?* This purpose and research question was answered by the empirical results of the regression models. The answer to the research question is that there is a relationship between the total expense ratio and the 5-year performance to last month for sustainable mutual funds on both the Swedish market and U.S. market when analysing both the simple and multiple regression models. As the research question has been answered, the studys purpose can be deemed to be fulfilled.

7.2 Truth criteria's

To ensure trustworthy results the authors have used three criteria's to evaluate their thesis. These criteria's were: Validity, Reliability and Generalisability. This section will consist of the authors explaining their decisions towards these criteria's in regard to the thesis.

7.2.1 Validity

The main objective regarding this criterion is to look upon the conclusions that are drawn from the study and its integrity (Bryman & Bell, 2019, p.46). There are different types of validity aspects, such as measurement validity, internal validity, external validity as well as ecological validity, the main use of these is to assess the quality of a business research (Bryman & Bell, 2019, p.46). Measurement *validity* is used to assess whether the study measures what is intended and is primarily used for quantitative studies, e.g., does the study capture the right phenomenon which are intended when studying the performance

of mutual funds (Bryman & Bell, p.46, 2019). This type of aspect, which is the measurement *validity* is looked upon in greater detail at this thesis as it covers a large aspect of this research.

In this study the research intends to measure the performance of sustainable mutual funds as well as the total expense ratios of sustainable mutual funds, thus it must assess whether this research paper actually succeeds to measure these parameters as intended. To assess the measurement there are different aspects to further study in order for the assessment to be correct and correctly tested, these are *face validity, concurrent validity, predictive validity, convergent validity,* and *discriminant validity* (Bryman & Bell, p.173-174, 2019). By using these testing criteria's when assessing the *measurement validity,* the assessment will be done correctly as there are several different aspects to look upon. To assess the measurement *validity* of this study the aspects above will be tested individually if needed.

Face validity is tested by asking people or experts in a specific area whether the measures seem to reflect what is intended, hence this test is an intuitive process (Bryman & Bell, p.173, 2019). This test can easily be used in a study to ensure validity, in the case of this study there have been people asked whether the measurements are used as intended, in which there have been agreements that it measures correctly.

Other aspects to look upon when assessing the validity of a study is the *internal* as well as *external validities* of the study. *Internal validity* is an aspect which is very important to look upon, as this aspect tests whether there is a good match between the observations done in a study and the theoretical ideas presented in the study (Bryman & Bell, p.363, 2019). Furthermore, Bryman & Bell (2019) explains that *internal validity* aims to test whether there is a casual relationship between two or more variables and if one individual variable can be responsible for the variation in a dependent variable. This research, however, will not study the causality between independent and dependent variables, instead this research paper aims to study the relationship between independent and dependent variables, hence there can be no assessment done regarding this aspect of validity.

External validity is used to understand whether the results of a study can be generalised and whether the results can be applied into different samples and selections (Bryman & Bell, p.47, 2019). This study will use the Swedish market as well as the U.S. market in order to conduct this study, hence, to answer the *external validity* there has to be assessed whether the results can be generalised and applied upon other countries and different markets. As this thesis will limit the study to just two domiciles there is not actual certainty that the results are to be generalised. Hence, the results from this study will not be applied to other countries and markets than the two brought up in this study, this is due to the uncertainty whether the results can be generalised or not, hence the decision has been taken to not generalise the results from this study to other countries.

7.2.2 Reliability

The reliability criteria's main focus is the consistency regarding research methods and measurements (Bryman & Bell, 2011, p.157). In turn this means that a high reliability equals high consistency in the results, with the consistency not depending on specific researchers or locations. Reliability consists of three different factors that help indicate the reliability of measure. The first factor is *stability,* and it takes into account the test

results stability of time, if it fluctuates or stays the same over a specific period of time and/or occasions (Bryman & Bell, 2011, p.158).

The second factor is *internal reliability* and is concerned about the coherence in the indicators, especially in instances where multiple items are measured in the same frame of research. One of the most used tests to determine the *internal reliability* is called the Cronbach's alpha and it is built upon the split-half method where different variables are tested to see if there is an acceptable degree of relation between the answers to two similar indicators. Cronbach's alpha measurement takes the average number between a variety of indicators used in the split-half method and creates an average number between 1 (high) - 0 (low), where 0,8 is considered an acceptable number to validate that there is an *internal reliability*. This measurement is frequently used in quantitative data analysis (Bryman & Bell, 2011, p. 158-159).

The third factor is called *inter-observer consistency*. This factor involves subjective judgements and how the observer can make consistent decisions over a period of time. This could include situations where an observer has to categorise items or people's opinions and answers (Bryman & Bell, 2011, p.158-159).

This study will put emphasis on *stability* and *internal reliability* as the study takes a quantitative approach to data sampling and data analysis. As there will be a minimal focus on subjective observations in regard to the sampled data, the *inter-observer consistency* factor will not be of major importance in this study.

As the study will take a quantitative approach the focus will be on *stability* and *internal reliability* to ensure consistent results towards the studies data collection and analysis. This will foremost take the form of consistent and strict criteria's when it comes to the data sampling. The study will focus on data sampling from an objective source (Eikon) and not from subjective sources such as people through interviews or forms. It is of great importance for the study to focus on the criteria's regarding data sampling, that the criteria's stays the same and is not manipulated and based on subjective motives or opinions.

7.2.3 Generalisability

Generalisability of results is how well the study's findings can be broadened to other areas, often a population or setting. Due to the study's stance towards a positivist paradigm, the study has collected samples in regard to each market and thereafter tried to generalise the results through statistical measures (Collis & Hussey, 2014, p.54). To be able to draw generalisable conclusions it is important that the sample selections are a correct representation of the chosen population (Collis & Hussey, 2014, p.54). Regarding the sample selection being a correct representation of the chosen population, the authors believe that the sample selection is being truthfully represented due to the strict measurements and criteria's in regard to the data collection. This gives the study's results a basis to be generalised in the selected areas and regions.

Nevertheless, the generalizability of the results cannot be transferred to mutual funds that are not included in the sample selection, for example mutual funds outside the selected criteria's of sustainability (ESG-rating <50) or mutual funds outside the Swedish and U.S. markets.

7.3 Ethical & Social Principles

While conducting the study, ethical considerations have been considered throughout the whole process. The actions and discussions regarding the direction of the study are based upon "The European code of conduct for research integrity" (Allea, 2017). Where they reference the four fundamental principles of research integrity (Reliability, Honesty, Respect & Accountability). Ethical principles are important aspects to take into consideration when conducting a scientific study, and because of the fact that our study is based on a quantitative approach it has been of utmost importance for us to handle our data and results presentation in a correct and proper way to avoid potential misunderstandings and questions regarding the accuracy of the results (Vetenskapsrådet, 2017). In this case it meant that we put great effort into specifying and clearly describing different variables, data samples and observations throughout the text. The moral aspects regarding personal information and the integrity of study participants are a very important aspect to take into consideration when conducting a study, however in our case this has not been an issue due to our focus on quantitative data instead of a more qualitative approach which has a larger focus on people and opinions.

In terms of data collection, one of the biggest challenges was to create a sample base which, in a fair and equal manner, included all possible data without any biases from the authors side regarding potential outcomes and results of the study. To avoid any selection bias in the study, a clear and precise set of requirements was created that included as many potential data points as possible that matched the area of research. This action should remove any potential selection biases from the study, as well as increase the potential generalisation of the results.

In terms of a societal contribution the study hopes to bring more attention to sustainable investing. By finding indications that the total expense ratios have a relationship to sustainable mutual fund performance, the increased literature and understanding regarding sustainable investing, may lead to it becoming more enticing to a larger group of investors. This could in turn lead to an increase in cash flow towards sustainable ventures. The increased focus and cash flow would hopefully have a positive impact on sustainable business ventures and accelerate the movement towards more sustainable practices in all corners of the financial sector.

7.4 Theoretical & Practical implications

The study set out to clarify if there was a relation between the financial performance and the total expense ratio in sustainable mutual funds on the Swedish and U.S. market. This study can be considered as a continuation of previous studies in this area, with the additional focus on sustainable mutual funds. This is an area that the authors consider to be increasingly relevant and hopefully this study among others provides valuable insight into the subject.

Previous studies have been conducted on both the return of sustainable mutual funds in comparison to conventional mutual funds, and on the relationship between the total expense ratio and the return of conventional mutual funds. This study combines the two subjects and tries to obtain an understanding of the relationship between the total expense ratio and the return on sustainable mutual funds. Previous studies have found differentiating results in regard to the relationship between the total expense ratio and the return on mutual funds, but it could be said that in general it has been confirmed that the total expense ratio does not have any significant effect on the return of the mutual fund.

In regard to the difference in return between sustainable mutual funds and conventional mutual funds it could be said that the general consensus is that investors do not miss out on increased returns by investing in sustainable mutual funds.

The study found that the total expense ratio had no relationship to the 5-year performance to last month on Swedish market when conducting a simple regression model while the simple regression model for the U.S. market did find a relationship although with a very low explanatory degree. Both markets showed a significant relationship between the total expense ratio and the 5-year performance to last month when conducting a multiple regression model. Hence, for private investors it can be determined and confirmed that the total expense ratio does indeed have relationship with the financial performance, however due to a very low explanatory degree the results must be used with caution and cannot be seen as guidelines.

However, due to the low degree of explanation described towards the total expense ratio in regard to the financial performance of sustainable mutual funds, there is room for additional studies to examine additional factors to concluded which additional variables have an impact on the financial performance of sustainable mutual funds.

Overall, in a practical sense the study found a relationship between the total expense ratio and the 5-year performance to last month for both the Swedish and U.S. market. However, due to the low degree of explanation, the results cannot be considered as a guideline for investors, but rather as an addition to already existing literature. On a theoretical level this study builds upon previous studies and transfers the focus towards a new area of increased relevance. The authors hope that future studies can build upon this study's results and thereby increase the literature in regard to sustainable investments.

7.5 Future research

There are some limitations to this study which gives room for further analysis in the form of further studies in this area. One specific area which could be further studied is the time span of the total performance, as this study has limited the timespan to only 5 years. To further increase the possibility of generalization, the timespan for future studies should be increased. However, it is important to bear in mind that with a longer timespan some sustainable mutual funds might have not yet existed or have changed their structure of their investments.

Another interesting route to examine would be to add additional independent variables to the conducted multiple regression models. This would be beneficial to further examine the degree of explanation in the model and possibly give investors a greater overview of specific variables that influence the return in sustainable mutual funds. This study has described some additional variables that could be interesting to examine, for example: “asset under management”, “net asset value (NAV)” and “years since registration”. This direction would, as mentioned before, be of great use to investors in the form of increased knowledge of value adding measurements in sustainable mutual funds that can explain the performance of sustainable mutual funds for private investors. In addition, sustainable mutual fund managers could also draw valuable information from this kind of study to further increase their knowledge about aspects that affect sustainable mutual fund performance and consequent return.

Furthermore, the Sharpe ratio that is used in the regression models does in fact have a strong relationship to the 5-year performance of the selected sustainable mutual funds. This can be explained to some extent by the fact that the Sharpe ratio considers the risk-adjusted return and hence increases the degree of explanation in the multiple regression models. However, the Sharpe ratio in this thesis is used as a control variable to further analyse the total expense ratio and its relationship toward the 5-year performance to last month. Due to this, the Sharpe ratio was determined to be relevant and acceptable to use as a control variable. However, for future studies the control variable can be changed to use some other variables that are explained earlier in the chapter.

References

Babbar, S. and Sehgal, S. (2018) 'Mutual Fund Characteristics and Investment Performance in India', *Management and Labour Studies*, 43(1–2), pp. 1–30. https://doi.org/10.1177/0258042X17745183

Bauer, R., Koedijk, K. and Otten, R. (2005). International evidence on ethical mutual fund performance and investment style. *Journal of Banking & Finance*, [online] 29(7), pp.1751–1767. https://doi.org/10.1016/j.jbankfin.2004.06.035

Baltagi, B.H., Bresson, G. and Pirotte, A. 2003. Fixed effects, random effects or Hausman–Taylor?: A pretest estimator. Economics letters. 79(3), pp.361–369. https://doi.org/10.1016/S0165-1765(03)00007-7

Basile, I., Ferrari, P. (2021). The level of sustainability and mutual fund performance in Europe: An empirical analysis using ESG ratings, *Corporate Social Responsibility and Environmental Management,* Volume 28 (5), 1446-1455, https://doi-org.proxy.ub.umu.se/10.1002/csr.2175

Belgacem, S, B. and Hellara, S. (2011). Predicting Tunisian mutual fund performance using dynamic panel data model. *The Journal of Risk Finance*, 12(3), pp.208–225. https://doi.org/10.1108/15265941111136950

Bryman., A. & Bell, E., (2017) *Företagsekonomiska forskningsmetoder*. 3rd Edition. Stockholm: Liber

Bryman., A. & Bell, E., (2011) *Business research methods.* 3rd Edition. New York: Oxford University Press.

Bryman., A & Bell, E., (2015) *Business research methods.* 4th Edition. New York: Oxford University Press.

Bryman., A & Bell, E., (2017) *Business research methods.* 5th Edition. New York: Oxford University Press.

Bryman., A & Bell, E., (2019) *Business research methods.* 6th Edition. New York: Oxford University Press.

Berk, J., & DeMarzo, P. (2019) *Corporate Finance.* 5th Global Edition. Harlow: Pearson.

Bodie, Z., Kane, A,. & Marcus A.J. (2011) *Investment and portfolio management* 9th Ed. New York: McGraw-Hill/Irwin.

Berkowitz, M.K. and Kotowitz, Y. (2002). Managerial quality and the structure of management expenses in the US mutual fund industry. *International Review of Economics & Finance*, 11(3), pp.315–330. https://doi.org/10.1016/s1059-0560(02)00099-0

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

Banz, R.W. (1981). The relationship between return and market value of common stocks. *Journal of Financial Economics*, 9(1), pp.3–18. https://doi.org/10.1016/0304-405x(81)90018-0

Burton G, M. (2013). Asset Management Fees and the Growth of Finance, *Journal of Economic Perspectives,Volume*, 27 (2), 97–108, https://doi=10.1257/jep.27.2.97

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

Chadha, S. (2012), Is a Mutual Fund's Performance Affected by its Size?, Retrieved from, *The Economic times*, available at: https://economictimes.indiatimes.com/mf/analysis/is-a-mutual-funds- performance-affected-by-its-size/articleshow/11400856.cms [Retrieved: 2022-02-12]

Chen, J., Hong, H., Huang, M. and Kubik, J.D. (2004). Does Fund Size Erode Mutual Fund Performance? The Role of Liquidity and Organization. *American Economic Review*, 94(5), pp.1276–1302. https://doi.org/10.1257/0002828043052277

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

COSTANZA, R. and DALY, H.E. (1992). Natural Capital and Sustainable Development. *Conservation Biology*, 6(1), pp.37–46. https://doi.org/ 10.1046/j.1523-1739.1992.610037.x

Crain, M.A. (2011). A Literature Review of the Size Effect. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1710076

Cremers, M. and Petajisto, A. (2009). How Active is Your Fund Manager? A New Measure That Predicts Performance. *AFA 2007 Chicago Meetings Paper*, EFA 2007 *Ljubljana Meetings Paper, Yale ICF Working Paper* No. 06-14 https://doi.org/10.2139/ssrn.891719

Dahlquist, M., Engstrom, S. and Soderlind, P. (2000). Performance and Characteristics of Swedish Mutual Funds. *The Journal of Financial and Quantitative Analysis*, 35(3), p.409. https://doi.org/10.2307/2676211

David, S., & Sutton, M. (2016). *Samhällsvetenskaplig metod*. 1st Edition. Lund: Studentlitteratur AB.

Dellva, W.L. and Olson, G.T. (1998). The relationship between mutual fund fees and expenses and their effects on performance. *The Financial Review*, 33(1), pp.85–104. https://doi.org/10.1111/j.1540-6288.1998.tb01609.x

Deloitte. nd. *What is ESG rating?* https://www2.deloitte.com/cn/en/pages/risk/articles/what-is-esg-rating.html [Retrieved: 2022-02-06]

Droms, W.G. and Walker, D.A. (1996). Mutual fund investment performance. *The Quarterly Review of Economics and Finance*, 36(3), pp.347–363. https://doi.org/10.1016/s1062-9769(96)90020-4

Elkington, J. (1997). Cannibals with forks: the triple bottom line of 21st century business. *Choice Reviews Online*, 36(07), pp.36–399736–3997. https://doi.org/10.5860/choice.36-3997

ENVIRONMENTAL, SOCIAL AND GOVERNANCE (ESG) SCORES FROM REFINITIV. (2021). [online] Available at: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/refinitiv-esg-scores-methodology.pdf. [Retrieved: 2022-03-02]

Gruber, M.J. and Blake, C.R. (1996). Survivor Bias and Mutual Fund Performance. *Review of Financial Studies*, 9(4), pp.1097–1120. https://doi.org/10.1093/rfs/9.4.1097

Elton, E.J., Gruber, M.J. and Busse, J.A. (2004). Are Investors Rational? Choices among Index Funds. *The Journal of Finance*, 59(1), pp.261–288. https://doi:10.1111/j.1540-6261.2004.00633.x.

Fama, E. F. and French, K. R., (1993). Common Risk Factors in the Returns on Stocks and Bonds. *Journal of Financial Economics*, 33(1), pp.3–56. https://doi.org/10.1016/0304-405x(93)90023-5

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

Fama, E. F. (1976). Efficient Capital Markets: Reply. *The Journal of Finance, 31*(1), 143-145. https://doi.org/10.2307/2326404

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

Fama, E. F., (1965). The behavior of stock market prices: I. Introduction. *The Journal of business (Chicago, Ill.)*. 38 (1) https:/doi.org/10.1086/294743

Ferreira, M.A., Keswani, A., Miguel, A.F. and 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

FINRA *Mutual fund: Feed & expenses* (nd) https://www.finra.org/investors/learn-to-invest/types-investments/investment-funds/mutual-funds/fees-expenses [Retrieved: 2022-02-08]

Fondbolagen. 2022. *Årsrapport: Fondsparandet 2021*: https://www.fondbolagen.se/globalassets/faktaindex/manadsstatistik/arsrapport_2021.pdf [Retrieved: 2022-02-02]

Garmhausen, S. 2011. Low Fees Drive Strong Returns at A Vanguard Fund. The American banker. 176(F350), pp.6–6.

Geranio, M. and Zanotti, G. (2005). Can mutual funds characteristics explain fees? *Journal of Multinational Financial Management*, 15(4-5), pp.354–376. https://doi.org/10.1016/j.mulfin.2005.04.008

GIL-BAZO, J. and RUIZ-VERDÚ, P. (2009). The Relation between Price and Performance in the Mutual Fund Industry. *The Journal of Finance*, 64(5), pp.2153–2183. https://doi.org10.1111/j.1540-6261.2009.01497.x

Gil-Bazo, J., Ruiz-Verdú, P. and Santos, A.A.P. (2009). The Performance of Socially Responsible Mutual Funds: The Role of Fees and Management Companies. *Journal of Business Ethics*, 94(2), pp.243–263. https://doi:10.1007/s10551-009-0260-4

Greene, W.H. (2012). Econometric analysis. 7th edition. Boston; London: Pearson.

GOD FORSKNINGSSED. (n.d.). [online] Available at: https://www.vr.se/download/18.2412c5311624176023d25b05/1555332112063/God-forskningssed_VR_2017.pdf [Retrieved: 2022-02-27]

Gruber, M. J. (1996) 'Another Puzzle: The Growth in Actively Managed Mutual Funds', *Journal of Finance (Wiley-Blackwell)*, 51(3), pp. 783–810. https://doi.org/10.1111/j.1540-6261.1996.tb02707.x.

Gutsche, G., and Ziegler, A. (2019) Which private investors are willing to pay for sustainable investments? Empirical evidence from stated choice experiments, *Journal of Banking & Finance, Volume 102*, 193-214, https://doi.org/10.1016/j.jbankfin.2019.03.007.

Gupta, A., Mishra, P., Pandey, C., Singh, U., Sahu, C. and Keshri, A. (2019). Descriptive statistics and normality tests for statistical data. *Annals of Cardiac Anaesthesia* 22(1), p.67. https://doi.org/10.4103/aca.aca_157_18

Hartzmark, S.M. and Sussman, A.B. (2019). Do Investors Value Sustainability? A Natural Experiment Examining Ranking and Fund Flows. *The Journal of Finance*, 74(6). https://doi-org.proxy.ub.umu.se/10.1111/jofi.12841

Hausman, J. A. "Specification Tests in Econometrics." *Econometrica*, vol. 46, no. 6, [Wiley, Econometric Society], 1978, pp. 1251–71, https://doi.org/10.2307/1913827

Hou, K., Xue, C. and Zhang, L. (2014). Digesting Anomalies: An Investment Approach. *Review of Financial Studies*, 28(3), pp.650–705. https://doi.org/10.1093/rfs/hhu068

HSBC. *Equity funds* (nd) https://www.hsbc.com.tr/en/investment-products/mutual-funds/equity-funds [Retrieved: 2022-02-02]

Hull, J. C. (2015) *Options, Futures and other derivatives.* 9th Edition. New Jersey: Pearson.

Hård af Segerstad, F., & Pettersson, F. (2016). *Aktiv förvaltning och indexförvaltning.* [Published document]. Stockholm: Fondbolagens förening.

Investment Company Institute. 2021. Investment Company Fact Book: A Review of Trends and Activities in the Investment Company Industry: https://www.ici.org/system/files/2021-05/2021_factbook.pdf [Retrieved: 2022-02-02]

Investment Company institute. 2022. *Release: Trends in Mutual Funds Investing:* https://www.ici.org/research/stats/trends_12_21 [Retrieved: 2022-02-03]

Investor.gov, U.S. securities and exchange commission *Mutual Fund Fees and Expenses* (nd) https://www.investor.gov/introduction-investing/investing-basics/glossary/mutual-fund-fees-and-expenses [Retrieved: 2022-02-08]

Investor.gov, U.S. securities and exchange commission *Mutual funds (nd)* https://www.investor.gov/introduction-investing/investing-basics/investment-products/mutual-funds-and-exchange-traded-1 [Retrieved: 2022-02-04]

Jegadeesh, N. and Titman, S. (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. *The Journal of Finance*, 48(1), pp.65–91. https://doi.org/2328882

Jensen, M.C. (1968). The Performance of Mutual Funds in the Period 1945-1964. *The Journal of Finance*, 23(2), p.389. https://doi.org/10.2307/2325404

Jones, R.C. and Wermers, R. (2011). Active Management in Mostly Efficient Markets.

Financial Analysts Journal, 67(6), pp.29–45. https://doi.org/10.2469/faj.v67.n6.5

Kaur, I. (2018). Effect of mutual funds characteristics on their performance and trading strategy: A dynamic panel approach. *Cogent Economics & Finance*, 6(1), p.1493019. https://doi.org/10.1080/23322039.2018.1493019

Korkeamaki, T.P. and 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), pp.413–438. https://doi.org/10.1111/j.1354-7798.2004.00257.x

Kölbel, J.F., Heeb, F., Paetzold, F., and Bush, T. (2020) 'Can Sustainable Investing Save the World? Reviewing the Mechanisms of Investor Impact', *Organization & Environment*, 33(4), 554–574. http://doi.org/10.1177/1086026620919202

Lawrence, A. Weber, J (2017). *Business and Society: Stakeholders, Ethics, Public Policy*. (15th ed). McGraw-Hill.

Lee, C.M.C., Myers, J. and Swaminathan, B. (1999). What is the Intrinsic Value of the Dow? *The Journal of Finance*, [online] 54(5), pp.1693–1741. https://doi.org/10.1111/0022-1082.00164

Liesen, A., Figge, F. and Hahn, T. (2013). Net Present Sustainable Value: A New Approach to Sustainable Investment Appraisal. *Strategic Change*, 22(3-4), pp.175–189. https://doi.org/10.1002/jsc.1931

Liew, W.T., Adhitya, A. and Srinivasan, R. (2014). Sustainability trends in the process industries: A text mining-based analysis. *Computers in Industry*, 65(3), pp.393–400. https://doi.org/10.1016/j.compind.2014.01.004

Lobão, J. and Gomes, S.C. (2015). PERFORMANCE AND CHARACTERISTICS OF MUTUAL FUNDS: EVIDENCE FROM THE PORTUGUESE MARKET. *Revista de Gestão, Finanças e Contabilidade*, 5(4), pp.125 - 148. https://doi.org/10.18028/2238-5320/rgfc.v5n4p125-148

Malhotra, D.K. and McLeod, R.W. (1997). AN EMPIRICAL ANALYSIS OF MUTUAL FUND EXPENSES. *Journal of Financial Research*, 20(2), pp.175–190. https://doi.org/10.1111/j.1475-6803.1997.tb00243.x

Malkiel, B.G. (2003). The Efficient Market Hypothesis and Its Critics. *Journal of Economic Perspectives*, [online] 17(1), pp.59–82. https://doi.org/10.1257/089533003321164958

Martyn Denscombe (2010). *Ground rules for social research: Guidelines for good practice.* New York Open University Press.

Mamun, A., Syeed, M., and Yasmeen, F. (2015). Are investors rational, irrational or normal? *Journal of Economic & Financial Studies*, 3(04), p.01. https://doi.org/10.18533/jefs.v3i04.161

Markowitz, H. 1952. Portfolio Selection. *The Journal of Finance*, Volume 7 (1), 77-91.

Marquaridt, D.W. (1970). Generalized Inverses, Ridge Regression, Biased Linear Estimation, and Nonlinear Estimation. *Technometrics*, 12(3), pp.591–612. https://doi.org/10.1080/00401706.1970.10488699

Melnikov, A. and Vyachkileva, D. (2018). Performance Analysis Based on Adequate Risk-Adjusted Measures. *Review of Business and Economics Studies*, 6(3), pp.5–18. https://doi.org/10.26794/2308-944X-2018-6-2-5-18

Meyer, T. (1994). *United States Department of Agriculture Rural Business-Cooperative Service*. [online] Available at: https://www.rd.usda.gov/files/cir45-1.pdf [Retrieved: 2022-02-27]

Miller, Ross M. "Paying the High Price of Active Management." *World Economics*, vol. 11, no. 3, 1 July 2010, pp. 5–23,

Morningstar. 2020. *Fakta om hållbart sparande*: https://www.morningstar.se/se/news/200309/fakta-om-hållbart-sparande.aspx [2022-02-05]

Morningstar. *What Are Sustainable Funds and How Have They Performed?* (2018) https://www.morningstar.com/insights/2018/01/31/sustainable-funds [Retrieved:2022-02-06]

Morningstar. *Tänk 4 steg till innan du väljer indexfond* (2020) https://www.morningstar.se/se/news/200011/tänk-4-steg-till-innan-du-väljer-indexfond.aspx [Retrieved: 2022-02-02]

Moore, D.S. (2011). The practice of statistics for business and economics. 3rd Ed. New York: W.H. Freeman.

Nationalencyklopedin. *aktiefond* (2022) https://www.ne.se/uppslagsverk/encyklopedi/lång/aktiefond [Retrieved: 2022-02-02]

Navone, M. and Nocera, G. (2015). Unbundling the Expense Ratio: Hidden Distribution Costs in European Mutual Fund Markets. *European Financial Management*, 22(4), pp.640–666. https://doi.org/10.1111/eufm.12078

Nordea. (2021). *Vad är ESG?* [online] Available at: https://www.nordea.com/sv/what-is-esg [Retrieved: 2022-03-10].

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

Prather, L., Bertin, W.J. and Henker, T. (2004). Mutual fund characteristics, managerial attributes, and fund performance. *Review of Financial Economics*, 13(4), pp.305–326. https://doi.org/10.1016/j.rfe.2003.11.002

Pensionsmyndigheten. *hållbara fonder* (2021) https://www.pensionsmyndigheten.se/hallbara-fonder [Retrieved: 2022-02-06]

Yan, X. and Su, X. (2009). *Linear regression analysis : theory and computing*. Hackensack, N.J.: World Scientific.

Mikkel Rasmussen (2003). *Quantitative Portfolio Optimisation, Asset Allocation and Risk Management*. London Palgrave Macmillan Uk.

Rohleder, M., Scholz, H. and Wilkens, M. (2010). Survivorship Bias and Mutual Fund Performance: Relevance, Significance, and Methodical Differences*. *Review of Finance*, 15(2), pp.441–474. https://doi.org/10.1093/rof/rfq023

Rousseeuw, P.J. and Hubert, M. (2011). Robust statistics for outlier detection. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 1(1), pp.73–79. https://doi.org/10.1002/widm.2

Ross M Miller 2010. Paying the High Price of Active Management: A new look at mutual fund fees. *World economics (Henley-on-Thames, England).* 11(3), p.5.

Saunders, M., Lewis, P. and Thornhill, A. (2019). *Research Methods for Business Students*. 8th Edition. New York: Pearson.

Salmerón, R., García, C.B. and García, J. (2018). Variance Inflation Factor and Condition Number in multiple linear regression. *Journal of Statistical Computation and Simulation*, 88(12), pp.2365–2384. https://doi.org/10.1080/00949655.2018.146337

SCB. 2021. *Investeringsfonder, tillgångar och skulder:* https://www.scb.se/hitta-statistik/statistik-efter-amne/finansmarknad/finansiella-foretag-forutom-forsakringsforetag/investeringsfonder-tillgangar-och-skulder/ [Retrieved: 2022-02-02]

Silva, S.E. da, Roma, C.M. and Iquiapaza, R.A. (2018). Does the Management Fee Signal the Performance of Equity Investment Funds in Brazil? *Revista de Educação e Pesquisa em Contabilidade (REPeC)*, 12(3), pp.286 - 302, https://doi.org/10.17524/repec.v12i3.1717

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

Sharpe, W. F. (1966). Mutual Fund Performance. *The Journal of Business*, *39*(1), 119–138. https://doi.org/10.1086/294846

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk. *The Journal of Finance*, *19*(3), 425–442. https://doi.org/10.2307/2977928

Sharpe, W.F. (1994). The Sharpe Ratio. *The Journal of Portfolio Management*, 21(1), pp.49–58. https://doi.org/10.3905/jpm.1994.409501

Sharpe, W.F. (1991). The Arithmetic of Active Management. *Financial Analysts Journal*, 47(1), pp.7–9. https://doi.org/10.2469/faj.v47.n1.7

Shilling. A. (2019). Biggest net fund inflows of the decade, *Money Management Executive,* volume 27 (6), 13-14.

Singh, A.B. and 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

Statista. 2021. *Number of mutual funds in the United States from 1997-2020:* https://www.statista.com/statistics/255590/number-of-mutual-fund-companies-in-the-united-states/[Retrieved: 2022-02-03]

Studenmund, A.H. (2015). *Using econometrics : a practical guide.* 6th Ed. Harlow, Essex: Pearson Education Limited.

www.sustainabledevelopment.report. (2021). *Sustainable Development Report 2021*. [online] Available at: https://www.sdgindex.org/reports/sustainable-development-report-2021/.

Svanen. 2022. *Vad bör jag veta om svanenmärkta fonder och investeringsprodukter*: https://www.svanen.se/spararen [Retrieved: 2022-02-06]

Swedbank Aktiellt (2021) *Allt större intresse för hållbart sparande – män står för den största ökningen* [Electronic] Available via: https://www.swedbank-aktiellt.se/2021/maj/allt_storre_intresse_for_hallbart_sparande_man_star_for_den_storsta_okningen.csp [Retrieved 2022-02-01]

Swedbank. nd. *Fondavgifter*: https://www.swedbank.se/privat/spara-och-placera/fonder/fondskolan/fondavgifter.html [Retrieved: 2022-02-07]

Sweden.se. (2021). *The Swedish economy*. [online] Available at: https://sweden.se/work-business/business-in-sweden/the-swedish-economy [Retrieved: 2022-03-01]

The European Code of Conduct for Research Integrity. (n.d.). [online] Available at: https://www.vr.se/download/18.ad27632166e0b1efab37a3/1547123720849/h2020-ethics_code-of-conduct_en.pdf [Retrieved: 2022-02-28]

The Swedish Economy December 2021. (2021). [online] *Konjunkturinstitutet.se*. Available at: https://www.konj.se/download/18.64b618e17e39f55b78589b5/1642420066741/SEDec2021.pdf [Retrieved: 2022-03-02]

The Swedish model The Swedish model. (n.d.). [online] Available at: https://www.government.se/4a5336/contentassets/8416c4ff1410419090181fe503920390/the-swedish-model.pdf. [Retrieved: 2022-02-17]

U.S. Department of the Treasury. (n.d.). *Economic Policy Reports and Notices*. [online] Available at: https://home.treasury.gov/policy-issues/economic-policy/economic-policy-reports [Retrieved: 2022-02-15].

Vanguard. *What is an index fund (nd)* https://investor.vanguard.com/index-funds/what-is-an-index-fund [Retrieved: 2022-02-01]

Vidal, M., Vidal-García, J., Lean., H.H., Uddin, G.S. (2015) "The relation between fees and return predictability in the mutual fund industry", *Economic Modeling*, Volume 47, 260-270, https://doi.org/10.1016/j.econmod.2015.02.036

Young, D.S. (2017). *Handbook of regression methods*. Boca Raton, Fl: Crc Press.

Zabiulla (2014). Portfolio strategies of fund managers in the Indian capital market. *IIMB Management Review*, 26(1), pp.28–58. https://doi.org/10.1016/j.iimb.2013.12.003

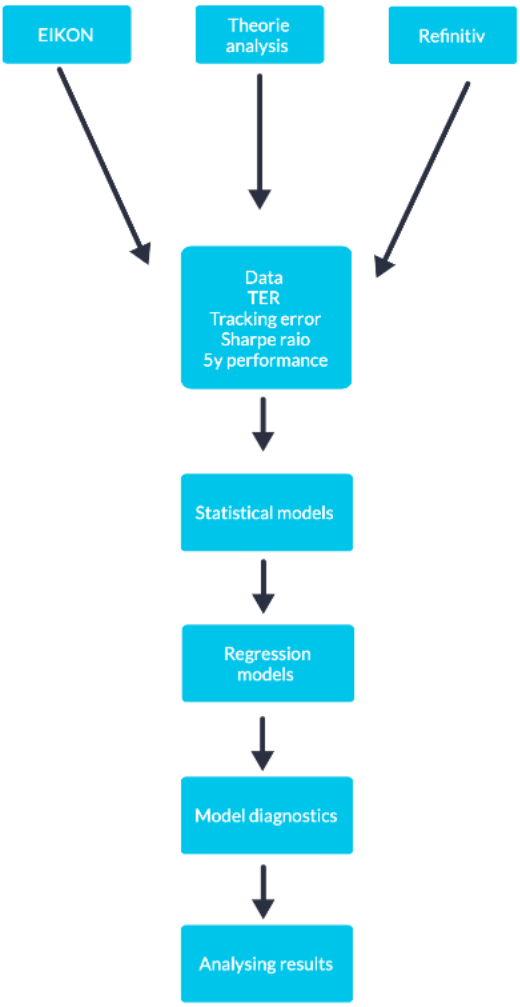
Ziolo, M., Filipiak, B.Z., Bąk, I., Cheba, K., Tîrca, D.M. and Novo-Corti, I. (2019). Finance, Sustainability and Negative Externalities. An Overview of the European Context. *Sustainability*, 11(15), p.4249. https://doi.org/10.3390/su11154249

Zimmermann, S. (2019). Same Same but Different: How and Why Banks Approach Sustainability. *Sustainability*, 11(8), p.2267. https://doi.org/10.3390/su11082267

Zopounidis, C. (2002) *New trends in banking management*. New York: Physica-Verlag.

Appendix

Appendix 1. A flow-chart depicting the work process



UMEÅ SCHOOL OF BUSINESS,
ECONOMICS AND STATISTICS
UMEÅ UNIVERSITY

Business Administration SE-901 87 Umeå www.usbe.umu.se