

Is Green the New Gold?

A study on the relationship between sustainability and risk of mutual funds



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Abstract

This thesis aims to investigate the relationship between the level sustainability and the level of risk for mutual equity funds. As the demand for more sustainable investment options increases, mutual funds have become more aware about positioning themselves as sustainable. The thesis studies 61 mutual equity funds using the Morningstar Sustainability Rating-score with a five-year daily data set, panel data time series, and regressions are made with different performance and risk measurements. Three of the regressions gave significant results. It showed that sustainability has a positive coefficient for the Jensen alpha and negative coefficient for Sharpe-ratio and standard deviation.

Keywords: Morningstar Sustainability Rating, Environmental Social Governance, Mutual Funds, Performance Measurement, Risk Measurement, Sustainability.

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1. Introduction

1.1 Background

Sustainability has become an imminent issue that needs to be addressed by all parts of society, due to the fast pacing climate changes we are facing. More and more people are focusing on the sustainability of their actions in every aspect of their lives, as the knowledge of the impact it has is increasing. In earlier stages of sustainable thinking, it was often only seen as an aspect of environmental sustainability, but with time the concept has been broadened to exist of more than just the environmental aspect. Today, both social and environmental sustainability are important factors in most people's daily lives and the knowledge and focus is increasing. We all know we live in a world of limited resources, both with regards to natural resources and human resources.

As the awareness of private individuals is increasing, the focus on sustainability is spreading to all aspects of daily life and is therefore also including possible financial investments. The increase in private investors wishing to invest more sustainable, has led to the demand for sustainable investment opportunities to increase. As a response to this, more and more sustainable investment opportunities are evolving, both in specific companies and in mutual funds with a sustainable profile. These types of funds have a specific Socially Responsible Investments (SRI) strategy. An increase in demand of mutual funds with SRI focus, has led to an increase in supply of these types of mutual funds.

As of today, there is no consensus on how to measure sustainability of mutual funds, and different institutions use different variables in order to measure and compare the level of sustainability of mutual funds. Hale (2017) describes how today the biggest contributors to data on sustainability are Sustainalytics and Morgan Stanley Capital International Environmental Social Governance (ESG) Research. These two uses different systems in order to evaluate the sustainability. This might lead to a large difference in the score and ranking of the same fund dependent on the data from which research institution it is based on, which can lead to confusion for the private investor (Hale, 2017). In a report by Böhme (2019), sustainability measures are criticised for not accurately ranking the level of sustainability of funds and companies. The argument is that the measures used

today from research institutions focus on the industry more than the level of sustainability for the specific company. This leads to, e.g. a bank highly involved in money laundering will still get a high sustainability score since their carbon dioxide emissions are low (Böhme, 2019).

The key findings from this thesis is that no relationship between the level of risk and the level of sustainability can be stated. Moreover, this thesis found that there is a decreasing trend in the MSR-scores for the studied funds.

1.2 Mutual Funds

Investing in mutual funds is a popular investment strategy for the average investor. The investor wants to be well diversified by owning several stocks. As described by Hull (2015) this is hard since it would require more capital than what the average investor have the possibility to save every month. It would also involve high transaction costs. Hull (2015) suggest that mutual funds offers a solution to the investor's problem. He explains that when investing in funds, the investor owns a share of the fund, while the fund itself can own different types of assets. The author describes three of the most common types of mutual funds: equity funds, bond funds and hybrid funds. Equity funds, contains shares of companies listed on the stock market. The manager of an equity fund can change the composition by buying and selling the stocks that the fund owns. Investing in an equity fund means that the investor owns a share of the fund, the investor does not own any of the stocks within the equity fund. This type of fund is related with higher risk than hybrid funds and bond funds due to the systematic risk of the market and the unsystematic risk for each individual stock. He thereby goes on by explaining how bond funds buy undervalued bonds and sell them for a profit. Bond funds are exposed to interest rate risk since the interest rate determine the price of the bonds. Hybrid funds own both equity and bonds (Hull, 2015).

A report from Fondbolagens förening (2019) confirmed that investing in mutual funds is the most popular investment strategy in Sweden. In April 2019 record high SEK 4 643 billion was reached in total investments in mutual funds in Sweden. Equity funds is the most popular among the different fund types (Fondbolagens förening, 2019). It is obvious that funds managers have

realized the demand for sustainable investment options as more and more funds are positioning themselves as a sustainable investment option.

1.3 Purpose

Today, there are many different types of sustainable mutual funds available on the market for private investors, which again can lead to difficulties in determining the level of sustainability in relation to the financial performance of the mutual fund. Previous studies, which will be presented in the next chapter, have been done on how both investments in companies with a sustainable profile as well as investments in sustainable mutual funds perform compared to investments without this specific SRI focus. As the results of these studies have been varying, there is no consensus on how sustainable investments perform compared to non-sustainable investments with regards to profitability and return. This has led to the purpose of this bachelor thesis instead will be to focus on the level of risk of sustainable investments, and how the risk changes when the level of sustainability of the mutual funds increase. The key findings of this study imply inconclusive results regarding the actual effect of sustainability on the performance and risk of mutual funds. These results are therefore in line with previous studies on the matter.

1.4. Disposition

In chapter 2 of this study previous research of the relationship between performance and risk of sustainable investments are presented. Chapter 3 describes the problem and hypothesis of this study. Further on in chapter 4, the theory used in the study is presented. Chapter 4.1 explains the definition of ESG and 4.2 describes the Morningstar Sustainability Rating. In chapter 4.3 the risk measures used in the study is presented, and 4.4 explains the performance measures of the study. Chapter 5 describes the methodology of conducting this thesis, as well as the data sampling and how the data was used. The result and analysis are presented in chapter 6, and is divided into initial findings, empirical results and collective results. Furthermore, chapter 7 includes the discussion of the findings, propositions for future research as well as the conclusion of the study.

2. Previous Research

Previous research has mostly focused on studying the relationship between performance measures and sustainability. The results have been varying, and different definitions of sustainability have been used. Earlier studies were more focused towards non-quantitative sustainability measurements, e.g. ethical funds and Socially Responsible Investments. Over time, more quantitative measurements have been developed and used in research such as ESG measures.

2.1 Performance of Ethical Funds

A study by Kreander, Gray, Power & Sinclair (2005) describes how the term ethical fund is widely used and is one definition of sustainable investments. An ethical fund is defined by not having return maximization as its only goal. Ethical funds provide the investor with the possibility to make investment decision based on their ethical preference and personal beliefs (Kreander et al., 2005). In the same study, 80 European funds, both ethical and non-ethical, were compared and they showed no difference in performance. The findings from the study suggested that the ethical funds were less risky when comparing the beta value and volatility between the ethical and non-ethical funds. Bauer, Koedijk and Otten (2005) conducted a study with the purpose to expand previous research on fund performance for ethical mutual funds compared to conventional mutual funds. They found three interesting results from their study. Firstly, they found no evidence on statistical differences in investment returns. Secondly, there is a difference in investment style, ethical funds are prone to be less exposed to market volatility and more invested in small-cap stocks compared to conventional mutual funds. Finally, ethical funds undergo a catch-up phase in which they tend to underperform conventional funds (Bauer, Koedijk & Otten, 2005).

2.2 Performance of Socially Responsible Investments

Socially Responsible Investments (SRI) is also a broad term with no clear definition. There is, however, some positive and negative criteria that should be obtained in order for an investment to

be called socially responsible. As Hamilton, Jo & Statman (1993) describe it, SRI could be defined as a portfolio that do not invest in alcohol, tobacco industry, and weapons manufacturing. They state that investments should be made in environmental-friendly companies with wholesome corporate governance. In the study, SRI are investigated to see if they would differ in performance compared to traditional investments. The authors measured the performance in terms of excess return for SRI funds and conventional funds by testing three hypotheses.

The hypotheses were whether:

“... the (risk-adjusted) returns of socially responsible portfolios are equal to the (risk-adjusted) expected returns of conventional portfolios.” (Hamilton, Jo & Statman, 1993, p.63).

“... the expected returns of socially responsible portfolios are lower than the expected returns of conventional portfolios.” (Hamilton, Jo & Statman, 1993, p.63).

“...the expected return of socially responsible portfolios is higher than the returns of conventional portfolios.” (Hamilton, Jo & Statman, 1993, p.64).

The argument the authors had for the third hypothesis was the possibility of conventional investors underestimating the risk that the non-socially responsible companies could release information that would have a negative effect on the stock. The study mentions investments in oil companies as example of a non-socially responsible investment. Oil companies run the risk of oil spill and drastic changes in oil price. The authors claim that this is a risk that is not involved in SRI. The study found no significant statistical difference in the performance for the SRI funds and the conventional funds. They concluded that socially responsible investments do not have any effect on the expected return from stocks or funds (Hamilton, Jo & Statman, 1993).

2.3 Performance and ESG-rating

Later studies have used the ESG-rating in order to quantify sustainability, which enables a better measure of SRI. In a study by Auer & Schuhmacher (2015) ESG-ratings from Sustainalytics are used to define SRI. The authors studied the relationship between performance and ESG-rating through three variables. These are: Environmental, Social (impact on society) and Governance, and investigate the relationship for each of the variables with investment performance. They focused on three geographical locations: The United States, Europe and Asia-Pacific. The results from the study showed that whether high ESG-ratings had a positive effect on investment performance were dependent on geographical location and which ESG variable tested. The authors found that in Europe investors pay a higher price in terms of fees when investing sustainable compared to the United States and Asia-Pacific (Auer & Schuhmacher, 2015).

While some research argues that there is none or an inconclusive relationship between ESG-ratings and performance, others argue for a clear positive relationship between the two. In a study by Friede, Busch & Bassen (2015) the authors argue that existing studies of the relationship between SRI and performance have not made use of the previous empirical results. To solve this problem the authors collected all the previous primary and secondary data from individual studies which ended up with 2200 academic studies. The findings from the study differed from most previous that had not been able to draw a conclusion on the relationship between ESG-rating and performance. The results show that investments with a good ESG-rating in 90% of the time have a non-negative impact on corporate financial performance (CFP). It also shows that investments with a good ESG-rating to some extent have a positive effect on CFP (Friede, Busch & Bassen, 2015).

It is clear that the previous research is divided in their conclusion of how sustainability and SRI as a variable impact the financial performance, hence more research within this area is needed. The previous research has focused on typical performance measures, therefore it would be of interest to investigate the relationship between SRI and risk measures.

3. Problem & Hypothesis

3.1 Problem

Previous studies within the area of sustainable investments have mainly focused on how sustainability as a variable affects risk-adjusted returns, and the results have been inconclusive. Hence more research is needed before we can appreciate how sustainability actually affects the total financial performance. To better understand the effect, it would be interesting to study how the financial risk is behaving when the degree of sustainability is changing. This thesis aims to shed light upon the effect that sustainability has on the level of risk when investing in a mutual equity fund.

3.2 Hypothesis

The hypothesis is based on the thought that mutual funds with a lower level of sustainability invests in highly volatile raw materials or industries in close connections with raw materials such as oil. This might then indicate that the mutual funds highly invested in these industries tend to have a higher level of risk compared to more sustainable equity funds. The main hypothesis is therefore **as the level of sustainability of the mutual equity funds increases, the risk decreases.**

4. Theory

4.1 ESG - Environmental, Social and Corporate Governance

The environmental leg of ESG measurements discloses how well or bad a company is performing with regards to environmental aspects. In extension, it can then be seen as how efficient resources are being used within the company, according to Hansson & Fraser (2013). The authors describe how a company which is performing well environmentally, uses its resources efficiently. This leads to a minimising of the environmental footprints of their production as well as their day-to-day business operations. According to the authors, it is thereby possible to see the economic and financial value of environmental sustainability within a firm. A company which uses its resources more efficiently compared to a peer, will most probably also have lower costs which can lead to greater profit and a better investment opportunity (Hansson & Fraser, 2013).

The social leg of ESG can be harder to determine the exact content of. However, according to Hanson & Fraser (2013, p. 23) it "...can be thought of as a barometer of how a company performs as a "corporate citizen"..." and evaluates the social standings of the company within the communities it operates in. It can thereby be connected to the environmental aspects, as keeping the environmental footprint of the company's operation as limited as possible. In turn, this can have positive social externalities for the community in which the company operates. Relationships between the company's partners and employees are considered when evaluating the social sustainability of the company. In addition, the safety of the employees is also often connected to the social aspect of ESG measurement (Hanson & Fraser, 2013). As these all in many ways are considered intangible qualities of a company, the valuation of the social aspect of ESG can be difficult for an investor. One method which the authors describes that is used in order to state the value of a company's social work and social standing, is to evaluate and compare the company with its competitors on certain aspects, and thereby enabling a comparable valuation of the company (Hanson & Fraser, 2013).

The corporate governance leg of ESG emphasises to what extent the management of the company are acting in its shareholders best interest, and whether or not the board are holding the management accountable for its actions towards shareholders (Hanson & Fraser, 2013). Hanson

& Fraser (2013) claim that in general, outside investors and shareholders are in disadvantage in regards of controlling the company and the management. If the management is acting in a way which goes against the company's initial business plan or the shareholders are feeling out of control, the investment would be considered riskier for investors which will lead to an expectancy of a higher return, in accordance to theory of risk and return. Even though legal compliance must uphold, they claim that in order for a company to score well on corporate governance, the shareholders and investors interest must be viewed as an important issue from the management and the boards perspective. Valuing the governance of a company will lead to subjective analysis as also the management and a company's human capital are considered intangible assets (Hanson & Fraser, 2013).

4.2 The Morningstar Sustainability Rating

According to Hale (2017), the purpose of the Morningstar Sustainability Rating (MSR) is to help investors to make right choices regarding sustainability of investments. The author claims that it can be challenging for an investor with limited resources to find tools in order to make investment decisions in accordance with ESG aspects. The MSR measures how well companies within the funds performs with regards to ESG, relative to peer funds, which creates the opportunity of comparison between similar portfolios regarding sustainability (Hale, 2017).

Furthermore, Hale (2017) describes how the MSR is created through a two-step process. Initially, a Portfolio Sustainability Score is calculated, which is an asset-weighted average of the holdings individual ESG scores. Moreover, deductions are made for controversies regarding companies the portfolio owns (Hale, 2017). Such controversies can be the money laundering case of Swedbank and Danske Bank at this moment, which will affect the Portfolio Sustainability Score negatively. The company-specific data on ESG is collected by Sustainalytics who analyses companies' performance on ESG issues (Hale, 2017).

He states that as companies are compared with peers, it can lead to two companies within two different industries to have the same score, even though one might outperform peers while the

other underperforms compared to its peers. In order to make the scores comparable, Morningstar normalises the scores for each peer group (Hale, 2017).

This leads to the equation:

$$Z_c = \frac{ESG_c - \mu_{PG}}{\sigma_{PG}}$$

ESG_c = The ESG score of company c

μ_{PG} = the mean of the ESG scores of peer companies

σ_{PG} = the standard deviation of ESG scores of peer companies

(Hale, 2017)

This creates a comparable, normalised ESG score of 1-100, where 50 is the mean.

In this bachelor thesis, the Morningstar Sustainability Rating, which is the normalised, comparable score between 1-100, is used in order to determine the extent of sustainability and the development of this of mutual funds (Hale, 2017).

4.3 Risk Measures

The risk measurements used measures the risk of the mutual funds by using historical data. According to Morningstar (n.d.), historical data and performance is no guarantee of future performance and risk but can be used as an indicator of future risks. Additionally, by calculating the different risk measures, it is possible to investigate which variables that previously have affected the changes in risk. This allows predictions for future changes in performance which affects the risk of the investments (Morningstar, n.d.).

4.3.1 Standard Deviation

Standard deviation measures the statistical average deviation of the return from the mean, giving an average value of which the mutual funds are deviating from their expected return, as explained by Morningstar (n.d.). A smaller standard deviation implies a more stable performance of the mutual fund, with lower level of volatility compared to a fund with a higher standard deviation. Standard deviation is often used in order to analyse the fund manager's handling of risk in previous periods, in addition to giving an indication of future performance of the mutual fund (Morningstar, n.d.). The standard deviation has shortcomings as it only calculates the statistical deviation of the

data. Therefore, it is not an advanced financial risk measurement, as it does not include any other parameters than historical performance. The formula for computing the standard deviation is as described by Bailey (2017):

$$\sigma_x = \sqrt{\frac{\sum(X_i - \mu)^2}{N}}$$

σ_x = the standard deviation

X_i = the observed return

μ = the expected return

N = number of observations

4.3.2 Value-at-Risk

According to Stambaugh (1996), Value-at-risk (VaR) is a risk measure widely used in the finance and insurance industry. Stambaugh portrays the basic concept of VaR to be a measure of the total potential loss from an asset or portfolio related to its probability. He goes on by describing the advantage of VaR to be that it makes it easy to compare different types of assets with each other either by the potential downside in terms of returns or in money. In order to calculate VaR, a confidence level must be assumed. It is normal to either have a 90%-, 95%- or a 99%-confidence level. For example, a fund reports a day-to-day VaR equal to 10 million USD and assumes a 95%-confidence level. Then the fund will with a 95% possibility not decrease with more than 10 million USD over the day (Asgharian & Nordén, 2007).

VaR is widely used as a risk measurement model but have also received criticism for its shortcomings. As explained in a study by Cao, Faseruk, & Hossain, (2018) VaR assumes that returns follow a normal distribution which, empirically, tend not to be true. They state that if the normal distribution does not hold then the tails could be fat or in other ways distorted and result in an underestimation of the VaR.

$$VaR = \sigma_x C_\alpha V = \delta \sigma C_\alpha V$$

$\sigma_x =$ Price volatility

$C_\alpha = \alpha -$ percent confidence interval

$V =$ Value

(Asgharian & Nordén, 2007)

4.3.3 Value-at-Risk Historical Simulation

One way of calculating the VaR is to use data from historical returns. Stambaugh (1996) describes how this method assumes that historical returns and future returns follow the same distribution. The advantage with this method, he states, is that the distribution of the returns is based on the actual distribution from the past. Therefore, no need of assumptions about the distribution is needed. If there is a fat tail, similar skewness or kurtosis, it will be captured in the data (Stambaugh, 1996). In “Räntebärande Instrument” (Asgharian & Nordén, 2007), it is described how to calculate VaR using the historical method. This is done by starting to list the historical returns in ascending order. The number that corresponds to the chosen confidence level is the return that is the VaR. They then describe, in order to calculate the loss in terms of money, one multiplies the VaR with the market value.

$$VaR = R_s^c V_{t-1}$$

$V_{t-1} =$ Market value at time $t - 1$

$R_s^c =$ The return that corresponds to the one – sided confidence level

(Asgharian & Nordén, 2007)

4.3.4 Conditional Value-at-Risk

Conditional VaR (CVaR) or Expected Shortfall (ES) is a substitute to the VaR model which measures the mean loss if losses exceed the point of VaR. As explained by Hull (2015) CVaR tells

the investor how much the average loss is if things get bad. CVaR also detects if there is any skewness or kurtosis in the tail which makes it a good compliment to VaR. Compared to VaR, CVaR is always more pessimistic in its predictions due to its mathematical strengths. A portfolio manager should never underestimate the risk of the portfolio and should therefore take CVaR in to account. Historical CVaR or ES is described by Nadarajah, Zhang & Chan (2014) as following.

$$ES_p(X) = \frac{(\sum_{i=[np]}^n X_i)}{(n - [np])}$$

$$X_{(1)} \leq X_{(2)} \dots X_{(n)}$$

$[x]$ = *The largest integer not larger than X*

n = *Number of observations*

np = *nth percentile (depending on the level of confidence)*

4.4 Performance Measures

Performance measures of investments measures the financial performance in relation to the risk of the investment, and in the situation of mutual funds, showing the value of the fund manager. The usage of performance measures enables the possibility of comparing and ranking investment opportunities. These types of measurements were first introduced by Sharpe (1966) with the Sharpe-ratio and have developed over time to become one of the most important type of measures when evaluating and comparing investments (Caporin, Jannin, Lisi & Maillet, 2014).

4.4.1 Sharpe-ratio

William Sharpe (1966) introduced a measurement for the risk adjusted return called the Sharpe-ratio, which is re-given by Caporin et al. (2014). They describe how the model uses the portfolio risk, the risk-free interest rate and the standard deviation for the portfolio. The Sharpe-ratio is a well-used model for calculating the reward-to-variability ratio for an asset. A high Sharpe-ratio implies a high reward rate in relation to the risk that the investor is taking. A low Sharpe-ratio implies that the reward is low to the risk that the investor is taking. By calculating the Sharpe-ratio

one can determine if a great return is the result of a high risk taking or through smart investments by the portfolio manager (Caporin et al., 2014).

$$S_p = \frac{r_p - r_f}{\sigma_{rp}}$$

S_p = Sharpe-ratio for the portfolio

r_p = Portfolio risk

r_f = Risk free interest rate

σ_{rp} = Standard deviation for the portfolio

The Sharpe-ratio is making several assumptions which lowers the reliability of the results. The model assumes that the return follows a normal distribution. Assets returns are affected by unpredictable circumstances which gives the return a skewness hence they do not follow a normal distribution. This may lead to an underestimation of the portfolio risk, which is described by Caporin et al. (2014).

4.4.2 The Treynor (1965) Reward-to-Volatility Ratio

The Treynor-ratio is described in Caporin et al. (2014) as a reward-to-volatility ratio. It is similar to the Sharpe-ratio but uses the beta value to measure volatility instead of standard deviation. The authors explain how the beta measures the risk the investor takes when investing in a stock or portfolio compared to investing in the market as a whole. It measures the return the investor gets related to the systematic risk or so-called non-diversifiable risk (Caporin et al., 2014).

$$Treynor-ratio = \frac{(r_p - r_f)}{\beta_p}$$

r_p = Portfolio return

r_f = Risk free interest rate

β_p = Beta value for the portfolio

(Caporin, et. al. 2014)

4.4.3 Beta Value

As presented in Berk & DeMarzo (2017), the beta value describes the unsystematic risk, how volatile an asset is in relation to the market volatility. To measure the beta value for a stock, they describe that the market where the stock is listed, works as its index. For example, a stock listed on OMX30 will use OMX30 as its index. Furthermore, they explain the values of the betas, saying that market have the beta value 1, and if the stock volatility is identical to the market return then the stock will also have a beta value 1. If the volatility is 20% higher than the market, the beta will be 1,2, and if it's 20% lower the beta will 0,8 and so on. The beta value can be derived from the Capital Asset Pricing Model (CAPM) which is defined in Berk & DeMarzo (2017). The CAPM describes the pricing of the asset, and by rearranging the function and using historical data, the Beta-value can be retrieved.

$$E[R_i] = r_i = r_f + \beta_i(E[R_{mkt}] - r_f)$$

β_i = Beta of the security with respect to market portfolio

R_{mkt} = Market return

r_f = Risk free interest rate

r_i = Security return

(Berk & DeMarzo, 2017)

4.4.4 The Jensen (1968) Alpha

The Jensen alpha is a performance measurement which capture the utility from portfolio managers investment choices. The model is described by Jensen (1968) as following.

$$\alpha_j^P = [E(r_p) - r_f] - [E(r_m) - r_f]\beta_{r_p r_m}$$

β_i = Beta of the security with respect to market portfolio

R_{mkt} = Market return

r_f = Risk free interest rate

r_p = Portfolio return

The author describes how the alpha is an indicator on how good the portfolio manager's stock picking skills are. If the alpha value is positive, it means that the manager beat the market. If it is negative, the manager performed worse than the market. In that way, the model tells the investor if the portfolio manager is producing enough return in relation to the risk that the investor takes (Jensen, 1968).

5. Methodology

5.1 Data

The collected data comprises of 61 Swedish mutual funds (see appendix A), each with net worth above 10 000 million SEK, thereby being the largest mutual funds registered in Sweden. This gives a selection of 61 mutual funds, on which the research is based on. The information regarding the funds has been collected through Morningstar, as well as Morningstar Direct. Data regarding these funds has been collected for the time period 31.03.2014 – 29.03.2019, giving data for five years. Two different types of data have been collected from the funds, regarding the daily return and the Morningstar ESG-ratings for each fund.

5.1.1 Daily Returns

Daily returns have been collected via Morningstar Direct. This data has then been used in order to do statistical analysis regarding standard deviations of the funds returns, as well as calculating the daily Sharpe-ratio, Treynor-ratio, Jensen alpha, VaR and CVaR for the funds.

5.1.2 Morningstar Sustainability Rating

Quarterly Morningstar MSR scores were collected via Morningstar Direct, and matched with the data of the daily returns. As the MSR rating is based on a series of variables, and therefore only updated and published quarterly, only quarterly data could be collected. The ratings were then matched with the daily returns, by having the same MSR score for each quarter. As many of the aspects included in the MSR are complex and slow-moving (Hale, 2017), it is also reasonable to assume that the score does not change on a day-to-day basis, which provides credibility to the process of matching the data.

5.1.2 Risk-free Rate

The risk-free rate, used for calculating the Sharpe-ratio, the Treynor-ratio, the Jensen alpha and the beta value, was given by the 10-year Swedish government bond, giving the rate of 0,29%. This rate was chosen in accordance with the study of PWC (2018), showing that 70% of the respondents,

containing of fund managers, risk capitalist and corporate finance advisors amongst others, used the 10-year government bond rate when calculating the risk-free rate (PWC, 2018).

6. Result & Analysis

The statistical method of this research is least square linear regression of time series. The linear regression follows the form:

$$y_{i,t} = \beta_0 + \beta_1 x_{i,t} + \varepsilon_{i,t} \quad t = 1, 2, \dots, N$$

$y_{i,t}$ = Dependent variable

β_0 = Constant

β_1 = Independent variable

$x_{i,t}$ = MSR – score

$\varepsilon_{i,t}$ = Error term

6.1 - Initial Results

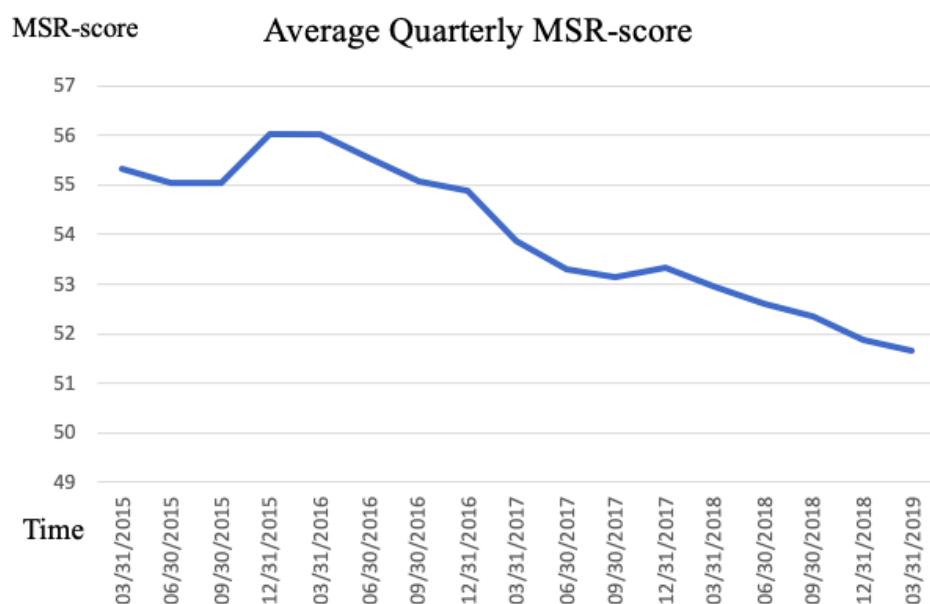
6.1.1 Descriptive Statistics on MSR-score

MSR-Score	
Min	39,95
Max	65,1
Mean	54,68852
Std. Dev	5,272
Median	54,77

Table 1: Descriptive statistics of the MSR-scores

When collecting the data for the Morningstar Sustainability Rating (MSR) for the mutual funds, an interesting observation was noted. By looking at the 898 observations of MSR-scores, it may seem as there is a general trend of decreasing MSR levels for the mutual funds. When analysing the data more closely, it shows that 90.1% of the mutual funds have had a decrease in their MSR value when comparing the first and last observation for each fund. As there is a significant global trend towards awareness of sustainability, this can be viewed as an idiosyncratic result of our

observations. Even though the reductions vary in extent, some being more dramatic than others, it is an interesting and noticeable result. There is some volatility of the MSR values, with some funds fluctuating quite substantially whilst others have stable rate of reduction. As visible in graph 1, the average MSR-score for all funds has decreased substantially over the observed time period.



Graph 1: The development of the average MSR-scores over time

The reason of the decrease in the MSR for the funds may have different explanations and might be dependent on individual factors for each fund. However, Morningstar did revise their rating system in October 2018, where they among other changes incorporated the funds historical holdings in their sustainability score (Morningstar, 2018). This might have led to more significant decreases in their combined MSR score, which then can be an answer to the decreasing growth rate of the Morningstar Sustainability Rating. Due to the global sustainability trend, it is unlikely that the observed funds have become worse in their sustainability work. It is, however, likely that the increasing transparency demands have made it easier for Morningstar and other sustainability measuring actors to compare the funds with each other leading to some funds increasing in the MSR and the others decreasing from previous levels.

Other possible reasons behind this might be the increase in social media and therefore spread of news regarding any type of events worldwide. As controversies of the mutual funds has a decreasing effect on the MSR, it is possible to assume that the extent of controversies and the possibility of viral spread of possible controversies that social media and internet enables, has also contributed to the decrease in the Morningstar Sustainability Rating scores. This is however difficult to prove as it is hard to state the development of the internet and social media's actual effect on the knowledge and spread of controversies. Additionally, new demands regarding transparency connected to the spread of the internet might lead to controversies being discovered in a larger extent compared to previous periods. It is difficult to state whether or not the amount of controversies and the extent of these actually has increased and that financial institutions are performing worse, or if it is just the spread and knowledge of the controversies that has increased as a result of social media.

6.2 Empirical Results

6.2.1 Descriptive Statistics of Risk Measures

Standard Deviation	
Min	0,74668705
Max	1,13577796
Mean	0,91881834
Std. Dev	0,07119987
Median	0,93100371

Table 2: Descriptive statistics of Standard Deviation.

VaR 95%	
Min	-1,88291
Max	-1,7662
Mean	-1,489798
Std. Dev	0,013
Median	-1,52682

Table 3: Descriptive statistic on VaR 95%

CVaR 95%	
Min	-2,85936
Max	-1,746973089
Mean	-2,179581123
Std. Dev	0,19
Median	-2.1725082

Table 4: Descriptive statistic on CVaR 95%

6.2.2 Result of Regressions on Risk Measures

Variables	Std. Dev.	VaR 95%	CVaR 95%
Constant	0,96395	-1,536732	- 2,331304
$\beta_{1,t}$	-0,00701	0,00092	0,002974
P-value	0,0000	0,7362	0,4740
R-squared	0,002903	0,001971	0,008875

Table 5: Regression results from risk measurements and MSR.

As visible in the table, there is no significant relationship between the Morningstar Sustainability rating and Value-at-Risk and Conditional Value-at-Risk and the hypotheses of $\beta=0$ are not

rejected. For the standard deviation, on the other hand, the null hypothesis can be rejected at the 95% significance level and that the standard deviation is decreasing as the Morningstar Sustainability Rating is increasing.

The negative relationship between the standard deviation and the MSR has a positive effect on the standard deviation, meaning it is decreasing as the MSR score is increasing. The relationship is however small, and as the sustainability scores for the different mutual funds are rather similar and the standard deviations also are fairly close in value the actual positive relationship might in reality not be that significant. When calculating the standard deviation of the standard deviation for each fund, we end up with approximately the number 0,0712. The small deviation in the actual standard deviation combined with the sort-of-similar values of MSR, indicates that the actual effect of sustainability scores on standard deviation is not really as hoped and the result of the regression may seem slightly misleading.

Furthermore, the R-squared value of the regression is low, meaning that the level of explanation of the regression is low. This does not mean that the significant result is wrong, but that the actual numeric explanation the regression provides with regards to the relationship between the MSR and the standard deviation is weak. The significant positive relationship might still hold even with a low R-squared value, but it makes it harder to determine the exact numeric effect it has.

VaR and CVaR were expected to decrease as MSR increases. The fact that there was no significant relationship between the two risk measurements and MSR could be explained by VaR and CVaR is depending on several other variables. It could also be that there were too few observations for the regression to be able to establish a significant relationship. This could also be viewed as if there is no significant relationship between ESG and these risk measures.

6.2.3 Descriptive Statistics on Performance Measures

Sharpe-ratio	
Min	-10,853512
Max	6,514748494
Mean	-0,2613688
Std. Dev	1,00021027
Median	-0,2660707

Table 6: Descriptive statistic of the Sharpe-ratio.

Treynor-ratio	
Min	-307,81102
Max	28,7131364
Mean	-0,2836869
Std. Dev	4,9247678
Median	-0,1239434

Table 7: Descriptive statistic of the Treynor-ratio. Here, the minimum value must be viewed as an extreme result.

Jensen alpha	
Min	-23,873623
Max	28,7131364
Mean	0,16241726
Std. Dev	1,86816565
Median	0,10434325

Table 8: Descriptive statistic of the Jensen alpha.

6.2.4 Results of Regressions on Performance Measures

Variables	Sharpe-ratio	Treynor-ratio	Jensen alpha
Constant	-0,205493	-0,3114876	0,315577
β	-0,001062	-0,011129	- 0,003191
P-value	0,1425	0,0045	0,0127
R-squared	0,000032	0,000096	0,000096

Table 9: Regression results from performance measurements and MSR.

As seen in the table, the hypothesis of the Sharpe-ratio cannot be rejected, while the hypotheses for the Treynor-ratio and the Jensen alpha can be rejected. This indicates that there is a significant relationship between the Morningstar Sustainability Rating and the Treynor-ratio and the Jensen alpha.

However, the desirable outcome of a significant relationship between the Treynor-ratio and the MSR score would be an increasing effect. Instead, our regression shows a negative relationship, where an increase in the MSR score actually leads to a worse Treynor-ratio and leading it to be more and more negative. Here it should also be noted the low R-squared value, which makes it more difficult to interpret the actual showings of the regression, but it still indicates a general negative impact on the Treynor-ratio.

Likewise, the result of the regression of the Jensen alpha shows an undesirable relationship where an increase in MSR scores negatively affects the Jensen alpha. A lower alpha-score indicates that the mutual fund is performing worse compared to the market, which with this result indicates that the level of sustainability of the mutual fund has a concrete negative effect on the funds financial performance. As it is compared to the market performance, it can mean that more sustainable stocks and funds actually have a lower financial performance compared to traditional, non-sustainable stocks and funds. Be that as it may, again the R-squared level is low and therefore the level of explanation of the regression is low.

If looking at this in connection with the previous result of a significant impact of increasing MSR scores on the standard deviation of the funds, it might be possible to assume that a lower standard deviation negatively affects the financial performance of the mutual funds. Therefore, we can see the negative relationship on the Treynor-ratio and the Jensen alpha, as when the standard deviation decreases, the reward-to-volatility measures also decreases. Furthermore, these different significant results validate each other, as they are pulling in opposite directions and therefore have a negative correlation, leading to when one goes up the other goes down and vice versa.

The regression of the relationship between the Sharpe-ratio and the MSR score shows no significant correlation between the two, and it cannot be stated that β is different from 0. The R-squared is also low, indicating a low level of explanation of the regression which gives credibility to the hypothesis of no significant effect between the two variables. Even though the Sharpe-ratio is a reward-to-volatility measure just as the Treynor-ratio and the Jensen alpha are, it is computed in a different way which might explain why this specific result is insignificant while the others are not.

6.3 Collective Results

The collected results show both a decreasing effect on the risk of the mutual funds as the Morningstar Sustainability Rating increases, as well as an increasing or non-changing effect as the Morningstar Sustainability Ratings increases. This gives mixed results regarding the main hypothesis as the level of sustainability of the mutual funds increase, the risk decreases. Therefore, it is difficult to state whether the main hypothesis can be rejected or not as the results are ambiguous.

All regressions ran have a low R-squared value, which makes it more difficult to analyse the regressions which actually show a significant result in either direction. The analysis of this research is therefore in many ways in line with previous research on the matter, stating that there is no significant relationship between the level of sustainability and the performance of mutual funds as well as the level of risk of the funds.

6.4 Discussion

The results of this study showed no actual significant relationship between the MSR-score and the level of risk of the mutual funds. Even though there was a significant relationship between the standard deviation and the MSR-score, this is not a sufficient measurement in order to state that the higher level of sustainability, the lower the level of risk. This do contradict our hypothesis, however the result is not unexpected as previous studies showed no significant effect of sustainability on financial performance.

Through the regressions made in this thesis, the Treynor-ratio and the Jensen alpha showed a negative relationship with the MSR-score. These results differ in some ways from previous research where positive or non-negative relationships have been established between performance and sustainability. Our results might differ due to the different performance measures used. It could also depend on the fact that previous research has used other sustainability measurements. At the same time as this thesis regression's results differ from previous research, they are also aligned in the sense that they are inconclusive. No certain conclusion can be drawn regarding the relationship between MSR-score and the chosen performance-and risk measurements. One reason could be that this thesis is lacking use of the empirical results from previous studies. The study by Friede, Busch & Bassen (2015) collected results from over 2000 academic studies and managed to prove a positive relationship between performance and ESG-rating. Therefore, one could argue that the results from this thesis could have been different if a similar method was used. This was not a reasonable possibility due to the time limit of this thesis.

Furthermore, the actual value of the sustainability score used, the Morningstar Sustainability Ranking should be discussed. As formerly mentioned, there is no existing consensus on sustainability ratings and scores today, making it somewhat problematic using these as a method of researching effects on different performance measures as different sustainability ratings can present different results. Additionally, in order to understand and make sense of the sustainability measurement, knowledge of the underlying factors is essential as values otherwise can be difficult to understand. For someone who is discovering the MSR scoring-system for the first time, some questions will of course arise regarding how to interpret and compare different scores for different

mutual funds. The result of the regressions and of this study might have ended up differently if other measures for sustainability was used, but due to the lack of a general rating system this choice had to be made.

In addition to the MSR scoring system to be difficult to interpret, the mutual funds in this study have somewhat similar results, reaching from the lowest measure of 39,95 and the highest of 65,1. This might indicate that all the funds are performing around the same level of sustainability, but it can also be shown as a weakness of the scoring system. Moreover, it decreases the credibility of the regressions showing a significant relationship, as these relationships in general had low β -values. With the scores being fairly similar and the relationships quite small, the actual effect might then not actually be as significant as the p-values of the regressions show.

7. Future Research & Conclusion

7.1 Future Research

Future research in the sustainability of funds are needed. It would be an interesting approach to divide funds in to two groups, one with the highest MSR-score and one with the lowest and then compare the performance and risk. Having a more contrasting study group could lead to more concluding results. Using a similar approach as this thesis and contrasting larger funds with smaller funds would also be of interest to determine if the MSR-score affect a fund depending on its size. Studies within the fields of sustainability scores and how these are computed might also be an aspect which can be included in future studies. As there is no consensus existing with regards to how to measure the sustainability of funds, and different institutions uses different variables for measurement. In an optimal scenario, a standardised scoring system would exist with exact comparability between them, giving private individuals the option to compare and choose based on personal preferences. This is of course highly demanding, reaching towards the impossible, as previously mentioned many of the aspects of sustainability are intangible qualities which are difficult to measure. If this thesis were not restricted by time, it would be of interest to study the effect of the three different ESG categories separately, Environmental, Social and Governance and if there would be a relationship to the risk and performance measurements.

7.2 Conclusion

In conclusion, we cannot state that the Morningstar Sustainability Rating has a significant impact on the level of risk of the mutual funds investigated. Even though some significant relationships have been shown, such as the decreasing standard deviation and the decreasing Treynor-ratio and the Jensen alpha, it is impossible to conclude that any actual observed effects on the risk have been made. An interesting and surprising finding was the decreasing MSR-score which was consequent for all 61 funds. It is difficult to draw a conclusion of this. However, we find it most likely that it is not that funds are performing worse, but rather due to changed scoring methods as well as higher level of controversies and transparency. This thesis has contributed to the research society as it has confirmed previous research using the latest data. A hypothesis that is being reconfirmed based on

up-to-date data brings additional value to the initial result. This further concludes that there is no observed relationship between the level of sustainability and risk based on used measures.

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Appendix

Appendix A: List of funds used in this thesis

Fund Name	
AMF Aktiefond Mix	Navigera Aktie 1
AMF Aktiefond Sverige	Nordea Alfa
AMF Aktiefond Världen	Nordea Sverige Passiv icke-utd
Avanza Zero	Öhman Global Hållbar A
Carnegie Sverigefond A	SEB Aktiesparfond
Didner & Gerge Aktiefond	SEB Dynamisk Aktiefond
Didner & Gerge Småbolag	SEB Hållbarhetsfond Global
Folksam LO Sverige	SEB Hållbarhetsfond Sverige Index
Folksam LO Världen	SEB Läkemedelsfond
Handelsbanken Amerika Småbolag Tema A1 SEK	SEB Sverige Expanderad
Handelsbanken Amerika Tema (Criteria)	SEB Sverige Indexfond
Handelsbanken Asien Tema	SEB Sverigefond
Handelsbanken Global Index Crit (A1 SEK)	SPP Aktiefond Global A
Handelsbanken Global Tema (Criteria)	SPP Aktiefond Sverige A
Handelsbanken Multi Asset 100	SPP Aktiefond USA
Handelsbanken Norden Selektiv (A1 SEK)	Swedbank Robur Access Sverige
Handelsbanken Nordenfond A1 SEK	Swedbank Robur Access USA
Handelsbanken Nordiska Småbolag	Swedbank Robur Aktiefond Pension
Handelsbanken Svenska Småbolag	Swedbank Robur Allemansfond Komplet
Handelsbanken Sverigefond Index	Swedbank Robur Ethica Global MEGA
Handelsbanken Sverigefond SEK	Swedbank Robur Globalfond A
Handelsbanken Tillväxtmarknad Tema (Crit)	Swedbank Robur Globalfond Mega
Handelsbanken USA Ind Crit A1 SEK	Swedbank Robur Kapitalinvest
Indecap Guide 2 C	Swedbank Robur Ny Teknik A
Lannebo Småbolag	Swedbank Robur Småbolagsfond Norden
Länsförsäkringar Global Hållbar A	Swedbank Robur Småbolagsfond Sverige
Länsförsäkringar Global Indexnära	Swedbank Robur Sverigefond
Länsförsäkringar Sverige Aktiv A	Swedbank Robur Sverigefond MEGA
Länsförsäkringar Sverige Indexnära	Swedbank Robur Technology
Länsförsäkringar Tillväxtmarknad Indexnära A	XACT Nordic 30
Länsförsäkringar USA Indexnära	