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ESG SCORE AND STOCK PERFORMANCE OF LISTED COMPANIES IN NASDAQ OMX HELSINKI

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and all works, important standpoints and data by other authors
have been properly referenced and the same paper
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The document length is 8003 words from the introduction to the end of conclusion.

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ABSTRACT

Sustainability has been a fast-growing megatrend in recent years due to climate change. The aim of this thesis is to evaluate if the Finnish listed companies' ESG scores have an effect on their stock market performance from 2016 to 2020. The study is made by using quantitative methods since the data is companies' monthly stock returns from Nasdaq OMX Helsinki main market and their yearly ESG scores from the Eikon database. The companies in the sample are divided into 12 different portfolios according to their ESG scores or industry, and later the performance is analyzed by using the Fama-French three-factor model. The results from the regression analysis show that there are no significant differences in performance between the high ESG rated companies and the low ESG rated companies. The market factor obtains statistically significant values in the analysis of all tóf the portfolios. Also, the study showed that in general the low ESG rated companies generated higher returns than the higher-rated ESG companies.

Keywords: Sustainable finance, ESG factors, Fama-French model, Portfolio performance

INTRODUCTION

Sustainability is nowadays a megatrend that has been growing rapidly in the past years. Responsibility is reflected in the everyday choices of consumers, such as buying a low emission electric car, favoring workplaces that treat their employees equally or buying clothes that have been produced ethically. Problems such as climate change have affected sustainability's importance among people. Also, for investors, there has emerged a responsible alternative to investing, which enables them to make responsible stock purchases.

Responsible investing can be described as taking into account the environmental (E), social (S) and governmental (G) factors when making the investment decision. Environmental factors include, for example, reducing greenhouse gas emissions and combating climate change. Social factors include the promotion of human rights and equality as well as the overall equal treatment in society. The principles of governance cover, for example, the prevention of bribery and corruption and also ensuring the ethics of companies' production chains.

When compared to other Nordic countries, Finland was late to adopt responsible investing. After the late start, Finland, with the rest of the Nordic countries, are in a leading position with sustainable development. In Finland, most of the ESG issues tend to be company specific since, for example, labor and human rights are already being controlled by laws (Savilaakso 2016). According to Finsif (2020), responsible investing is continuously increasing in Finland. Due to this, the topic of this study is very timely since there are not many previous studies made about responsible investing focusing on Finland.

This study focuses on the following research questions:

1. Is a company's ESG score related to their stock performance focusing on Nasdaq OMX Helsinki main market?
2. Does a high rated ESG portfolio generate higher returns than the low or medium portfolios?

The aim of this thesis is to determine if the companies' ESG scores have an effect on their stock performance. The thesis analyzes the differences between Finnish low rated and high rated ESG companies listed in Nasdaq OMX Helsinki main market. There are 133 companies in the data set during the time period from 2016 to 2020. The ESG scores used in this thesis are yearly scores from 0 to 100, and those are found from the Eikon database, where 0 represents the worst ESG score and 100 the best. Based on the companies' ESG scores the companies are divided into low, medium and high ESG portfolios. There are also nine additional portfolios created by three industries with most companies which are consumer services, industrials and technology. Inside these three industries, the companies are also divided by the ESG scores into low, medium and high portfolios.

The structure of this thesis is divided into three main sections. In the first part there is background knowledge about the topic of this thesis where there are all the concepts such as sustainable finance, ESG and stock market performance explained. Also, there are the previous studies highlighted in this section. The second part is about methods and data where there will be introduced the Fama-French Model which will be applied to the data to find if there is a correlation between the ESG scores and the stock performance. In this section, there will also be explained more about the data and the construction of portfolios. The last part is analysis and discussion where there will be an interpretation of the results of the regression model, indexed returns of the portfolios and also a discussion about the findings before formulating the answer to the research question.

1. Sustainable finance

1.1. Background

The field of sustainable finance developed in reaction to the sustainability crisis, as well as as a result of financial liberalization (Lagoarde-Segot 2019). Many economic models were created with little consideration for environmental concerns. The starting point was at the dawn of the Industrial Revolution in the 19th century, when labor and capital were rare factors of production, but nature and its services were abundant. During that time, there were still plenty of natural emissions and carbon emissions were limited. These models are still in use but they aren't as assertive as they once were. We are now in the process of transitioning to a more circular economy (Schoenmaker, Schramade 2019).

The interaction of finance with economic, social, and environmental factors is referred to as sustainable finance. Finance can help with strategic decisions about the trade-off between long-term and short-term goals. (Schoenmaker, Schramade 2019). The term sustainable finance is quite broad and there is no standardized definition (Wilson 2010). Zadek and Flynn (2013) specify that phrases like "green finance," "sustainable finance," "green investment," and "climate finance" are sometimes used interchangeably, making the distinctions between these concepts difficult to identify. To avoid misunderstandings, it is necessary to define sustainable finance due to the loose use of language in this subject.

One definition of sustainable finance is made by the Swiss Sustainable Finance (SSF 2022). They define sustainable finance as “Any form of financial service integrating environmental, social and governance (ESG) criteria into the business or investment decisions for the lasting benefit of both clients and society at large.” (Swiss Sustainable Finance 2022). Basically, the concept of sustainable finance is in relation to sustainable development. Sustainable development simply means that present and future generations will have an access to the resources they require, such as water, food, energy, and healthcare, without jeopardizing the Earth's processes. (Schoenmaker, Schramade 2019).

According to Caplan, Griswold and Jarvis (2013), responsible investing is divided into three areas. The first category they identified is socially responsible investing (SRI), which refers to a portfolio-building method that uses negative screening to try to avoid investing in specific stocks. The second type is impact investing, which is making investments in firms with an aim to affect environmental or social change. Environmental, social, and governance (ESG) investing is the final category they developed, which aims to include ESG considerations in fundamental investment research (Caplan et al. 2013). All of the above investing strategies serve very different purposes.

The United Nations Principles of Responsible Investing (PRI) (2006) were created to assist institutional investors in making decisions in order to optimize both financial success and overall good. There are, in total, six principles which are the following (United Nations official webpage 2006):

- Principle 1: We will incorporate ESG issues into investment analysis and decision-making process.
- Principle 2: We will be active owners and incorporate ESG issues into our ownership and practices.
- Principle 3: We will seek appropriate disclosure on ESG issues by the entities in which we invest.
- Principle 4: We will promote acceptance and implementation of the Principles within the investment industry.
- Principle 5: We will work together to enhance our effectiveness in implementing the Principles.
- Principle 6: We will each report our activities and progress towards implementing the Principles.

The above mentioned principles assist investors in incorporating the ESG issues into their investment practises. The principles are created to help create a favourable investment climate. The goal of these principles is to encourage businesses to make beneficial contributions to economic, environmental, and social progress (OECD 2007).

There are seven main approaches to sustainable investing, according to the Global Sustainable Investment Review 2020. These ideas were first released in 2012, but they were updated in October

2020 to reflect current thinking in the global sustainable investing industry. Norms-based screening, negative/exclusionary screening, best-in-class/positive screening, corporate engagement & shareholder action, sustainability themed/thematic investing, ESG integration, and impact/community investing are all examples of these approaches (GSIA 2020).

The starting point for responsible investing is usually limited, with the assumption that responsible investments can be distinguished from irresponsible investments. Making lists of prohibited investments or industries is a common technique to apply such segmentation force (Lehtonen 2012). Screening is the practice of deciding which investments to include or exclude from investment portfolios based on a variety of social and environmental factors. There are two main approaches to determine whether an investment is ethical in screening. The first approach is negative screening, which means that particular firms are avoided, such as those involved in the sale of alcohol, tobacco, or gambling (Michelson et al. 2004). Exclusion can also apply to countries and companies that do not respect human rights or the fundamental principles of the International Labor Organization (ILO) worker's rights, or who otherwise demonstrate economic, ecological or social irresponsibility (Lehtonen 2012).

The opposite practice to negative screening is positive screening which means that firms are engaged with socially responsible practices (Michelson et al. 2004). Taking a proactive approach to environmental, social, and government policies is referred to as positive screening. It contains a number of beneficial investment alternatives, but it also requires careful examination and judgment (Lehtonen 2012). Some authors have argued in favor of positive screening procedures, citing the ineffectiveness of negative screening in promoting ethical business behavior (Trinks, Scholtens 2017).

Furthermore, norm-based negative screening could be utilized to strengthen global financial markets' ethics and governance. These screening instances, on the other hand, present serious issues, such as informational complexity, huge discrepancies in measurement methods, and a lack of clarity and transparency on specific methodologies. In fact, every type of screening is vulnerable to the issues mentioned because screening involves the selection of some companies while excluding others by definition. For practical reasons, other tactics like engagement may be preferable to negative screening (Trinks, Scholtens 2017).

In comparison to the rest of the Nordic countries, Finland was late to adopt responsible investing (RI). It has expanded widely and tenaciously among managers and asset owners since its inception. RI focuses on investments and how they relate to a variety of environmental, social, and governance (ESG) challenges. The majority of ESG issues in Finland are company specific, as regulation already assesses human rights, labor rights, and environmental corruption in Finland (Savilaakso 2016).

The PRI has had a considerable impact on the perceptions of responsible investment among Finnish institutional investors. For many Finnish investors, the ideas of ESG integration and active ownership have served as the foundation for a responsible investment strategy. According to Finsif, the popularity of responsible investing is continuously increasing in Finland. In addition, when compared to the size of the investment market in the Nordic region, Finnish investors' commitment to responsibility is significant (Finsif 2020).

1.2. ESG principles in investing

Responsible investing and its tools are constantly evolving. In ESG investing the investors analyze the company's environmental aspects in addition to traditional economic figures. The investors take into account the environmental (E), social (S) and governmental (G) factors of the companies. The environmental factors take into account for example combating climate change and reducing greenhouse gas emissions. The social factors include the promotion of human rights and equity as well as the overall equal treatment in society. The principles of governance covers for example the prevention of bribery and corruption and also ensuring the ethics of companies' production chains (Silvola, Landau 2019).

In responsible investing all of these ESG factors are taken into account so that the return on investments is improved and the risks are reduced. To take the ESG issues into account in responsible investing there is not just one correct way. The investor is able to choose the best tools and take ESG issues into account with different approaches. When considering ESG issues, investors can seek to find latent competitive advantages in companies that have not yet been priced by the market business rates (Kalpio 2020).

The use of the ESG classification in research and investment decisions has been particularly popular in Europe, but the popularity of responsibility criteria is fast expanding in other regions of the world as well. (International Trade Centre 2019). There is no single way to quantify sustainability due to the extensive use of ESG classifications. There are several actors that measure sustainability and provide sustainability ratings. The purpose of these is to assess the sustainability of companies and to pass this information to investors, shareholders and other financial sectors. The majority of the time, sustainability evaluations and analyses are based on the companies' own assessments (Escrig-Olmedo et al. 2019).

1.3. Stock market performance

Stock prices are affected by many different factors in the market. The trading behavior of investors is the main influence on the movement of share prices which includes the number of trades and the trading volume with an assumption that stock prices are determined by supply and demand if there does not exist an external interference. Basically, if more people want to buy a stock rather than sell it, the stock prices will move up. It also works the other way around by the same logic, so if more people want to sell the stock rather than buy it, the price will decrease (Li, Pan 2022). An equilibrium price is a point where the current supply and demand meet and the stock is sold (Sun et al. 2016).

Company share buybacks and share issues are examples of supply factors. Demand is influenced by a broader range of factors such as company news, economic factors, unexpected events, and industry trends. Political situations and international affairs also have an effect on the stock prices even though those do not belong under the supply or demand category. Stock prices are constantly changing in order to respond quickly to news and other announcements (Li, Pan 2022). When the various factors are examined more closely, it is discovered that news explains only 30% of the movements in stock prices (Hopman 2007).

A new relevant factor began to influence the stock market in March 2020. Covid-19 began in China and has since spread throughout the world. On March 11th, it was designated a pandemic, and as a result, numerous countries imposed various limitations to protect their citizens. The stock market reacted significantly to the pandemic, with the Dow Jones index dropping 37% from the start of

the outbreak until March 23rd. Following that, international stock prices began to recover (Nordea 2022).

1.4 Previous studies

There have been many previous studies made about comparing companies' ESG scores to their stock performance. La Torre et al. (2020) investigated in their paper how ESG components affect stock returns. In their study they analyzed the companies included in the Eurostoxx50 index from 2010 to 2018 according to the companies ESG scores. In this paper they used a two-step methodology to analyze the performance of companies. They used panel data technique to test how the different ESG variables affect the returns. Their study showed that the correlation between the ESG index and the stock returns was very weak or absent but for a few companies investing in ESG led to higher returns. Those companies where investing in ESG affected positively, were mostly in energy and in utilities sectors (La Torre et al. 2020).

Derwall et al. (2005) analyzed in their study does socially responsible investing lead to better portfolio performance. They compared two different equity portfolios with high and low performance on eco-efficiency. The eco-efficiency was measured by Innovest Strategic Value Advisor's corporate eco-efficiency scores. In their study they found out that in the period of 1995 to 2003 the high-ranked portfolio caused higher average monthly returns than the low-ranked portfolio. They also found a statistically significant difference between high-rated and low-rated portfolios where the low-rated portfolio outperformed the latter when they applied the Carhart (1997) model. In their study they also found out that the performance remains important when adjusting transaction costs (Derwall et al. 2005).

Zehir and Aybars (2020) investigated in their study the performance of portfolios constructed by ESG scores in Europe and Turkey. In their study they formed eight portfolios based on the companies' ESG scores. They divided the highest 10% percent of the companies to the top portfolio and the lowest 10% to the bottom portfolio. After forming the portfolios they applied the capital asset pricing model and Fama-French three-factor model as performance measurement benchmarks. The overall findings in their study indicated that there is no significant relationship between portfolio performance and responsible investments (Zehir, Aybars 2020).

In their study, Lööf and Stephan (2019) analyzed the correlation between a company's ESG score and its stock market downside risk. They used daily returns from 887 stocks listed on the European stock exchange from 2005 to 2017. They investigated if the ESG score and its individual pillars have an impact on the downside risk of stock returns. Later, they used the Fama & French three-factor model to see if there was a relationship between the ESG score and the risk-adjusted return level. They discovered no consistent correlation between the variables based on the results of the Fama and French three factor model (Lööf, Stephan 2019).

Li et al. (2018) analyzed in their study whether superior environmental, social and governmental disclosure affects firm value. They employed a broad sample of 350 listed companies in their data set and as a result they discovered a positive association between the firm value and the ESG disclosure level. In their study they used figures describing the market value of a company as an explanatory variable for a company's performance (Li et al. 2018).

The results from the empirical studies vary a lot. In some of the previous studies there is not found a significant correlation between the company's ESG score and their stock return. However, in some studies also a significant relationship between the variables is found. As this study is based on the Finnish stock market, the results from the similar studies conducted in Europe are the most significant ones when conducting the results. Overall the studies located geographically in Europe show a very low or no correlation between the variables which is why there is a hypothesis made that the companies' ESG scores do not affect the company's returns. In the following section the methods and data used in this study are presented.

2. METHODS AND DATA

Because the study investigates stock performance and ESG scores, it will be undertaken as a quantitative study. The study will be conducted using the Fama-French three-factor model because the study's goal is to see if ESG rankings have an impact on the stock performance of Finnish companies on the Nasdaq OMX Helsinki main market.

2.1. Fama-French model

A general way in modern portfolio theory is analyzing a portfolio and its expected returns using the Capital Asset Pricing Model also known as CAPM model studied and developed by many specialists in the field including Sharpe (1964), Traynor (1961), Lintner (1965) and Mossin (1966). The CAPM model is used to forecast an object's future value by taking into consideration both the object's systematic risk and the market portfolio's expected return. Most practitioners choose a one-factor CAPM-model when estimating the return on an individual stock (Bartholdy, Peare 2004). However, the CAPM-model has been questioned since it ignores other elements that affect the stock or portfolio's value formation in addition to those described above. Several researchers have discovered characteristics that influence portfolio expected returns that are not predicted by the CAPM model (Erdinc 2017).

A three-factor Fama-French model created by Eugene Fama and Kenneth French (1993) was developed to improve the original CAPM-model. It is recommended to use when estimating the returns of portfolios consisting of several stocks (Bartholdy, Peare 2004). The Fama-French three-factor model performs the same thing as the CAPM-model in terms of predicting expected rates of return. Compared with CAPM, two additional estimated risk factors are incorporated as baseline model variables (Ziegler et al. 2007). Size risk and value risk are explanatory factors in the Fama-French model.

To help to conduct the answers for the research questions formatted for this study, Fama-French three-factor model is used. As mentioned earlier this model is recommended to use when estimating the returns of portfolios consisting of several stocks. This study will focus on portfolios

constructed in different methods which will be explained more precisely in the next chapters. Fama-French three-factor model is compounded using Formula 1:

$$r_{it} - r_{ft} = \alpha_i + \beta_i(r_{mkt} - r_{ft}) + s_i SMB_t + h_i HML_t + \varepsilon_i \quad (1)$$

Where:

r_{it} = the return on portfolio i in month t

r_{ft} = risk-free rate in month t

r_{mkt} = the return of the market benchmark in month t

SMB_t = Small Minus Big in month t

HML_t = High Minus Low in month t

When looking at Formula 1, the factor related to the size of the company (SMB_t) tells how the size of the companies measured by the market value affects the return expectations of the company's shares. The value factor (HML_t) reflects the effect of the ratio between a company's book value and its market value on the return expectations of that company's shares. Results on the effects of the company's size and value factors on portfolio returns can also be found later in a study by Fama & French (2015). Return expectations are higher for smaller businesses, according to the findings of the study. Return expectations decrease as a company's size increases. The Size Effect has been used to explain this occurrence (Desban, Jarjor 2015).

2.2. Data

To evaluate the performance between low rated ESG companies and high rated ESG companies, there is a need to collect data of the companies' historical performance on the stock market and the companies' historical sustainability performance. The data used in this quantitative study is collected from the Eikon database.

Originally there were 133 listed companies in Finland in the main market in Nasdaq OMX Helsinki. During the initial screening of the data, there was a discovery that there were 53 companies with no reported ESG score for the period of 2016 to 2020. The exclusion of these companies resulted the data consisting of 80 companies. Furthermore, there were several stocks in the data with only one reported ESG score during the period. To avoid loss of many observations, the same ESG score was used for these companies for the whole period of time. The data also

consisted of companies which listed in the stock exchange in the middle of the time period. To avoid the loss of observations, those stocks were included in the study.

The final data set consists of monthly reported closing share prices of 80 companies and their yearly reported ESG scores since the database where the data was collected used the yearly ESG scores to measure the sustainability of the companies. As the purpose of this study is to measure the stock performance, the first thing to do was to convert the share prices into returns by calculating the return series to all the stocks included in the data.

The ESG scores reported in the Eikon database varies from 0 to 100, where the 0 represents the worst possible ranking and the 100 the best. In the below Table 2.2 there is summarized the factors that contribute to the formation of the company's ESG score.

Table 2.1: ESG criteria in Eikon database (Eikon database, 2022).

3 classes	10 themes	Examples
Environmental (E)	Resource use	Total Energy Use Renewable Energy Use Ratio Water Efficiency
	Emissions	CO2 Emissions Waste Recycled To Total Waste Biodiversity Impact Reduction
	Innovations	Environmental Products Product Impact Minimization Noise Reductions
Social (S)	Workforce	Health & Safety Policy Injuries To Million Hours Women Managers
	Human rights	Policy Child Labor Policy Forced Labor Policy Freedom Of Association
	Community	Policy Fair Competition Donations / Million In Revenue Policy Bribery And Corruption

	Product responsibility	Policy Customer Health & Safety Policy Data Privacy Product Responsibility Monitoring
Government (G)	Management	Board Functions Policy Board Structure Policy Executives Cultural Diversity
	Shareholders	Shareholder Rights Policy Director Election Majority Requirement Shareholders Vote On Executive Pay
	CSR strategy	CSR Sustainability Committee Stakeholder Engagement CSR Sustainability Reporting

As it can be seen from the Table 2.2, ESG score consists of environmental, social and governmental factors. These factors are again divided into total of 10 different subfactors. The environmental factor is divided into three subfactors, social to four and governmental to three subfactors which describes the formation of ESG score more precisely.

In order to investigate the stability of the ESG scores in the data set, the next step is to analyze the average yearly ESG score for all the companies to see if there exists a trend in ESG scores from 2016 to 2020.

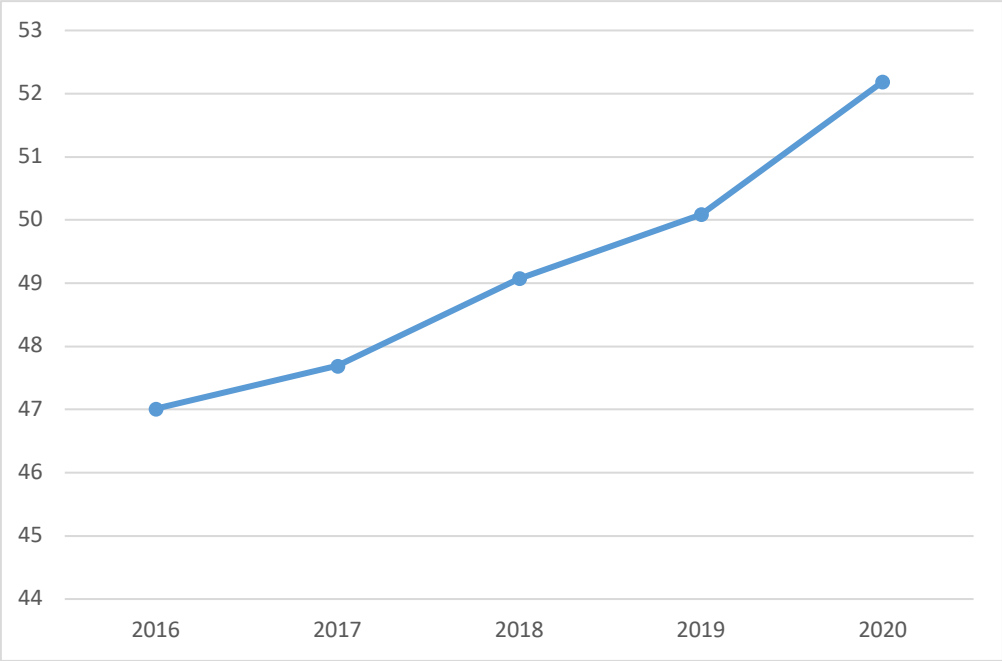

Figure 2.1: Average yearly ESG score

Source: Source: Author's calculations based on data from Eikon database (2022)

Figure 2.1 helps to detect if there is a trend in general in the ESG scores. As shown in the figure, there is an upward trend in the yearly ESG scores which can be explained by many reasons. Many companies have started to focus more on the environmental issues when they have noticed that the investors have also started to show interest in sustainable investing. Due to legislation, Finnish companies need to pay more attention to the prevention of the climate change. Also many of the companies have promised to lower their emissions or to be carbon neutral in the future. Next there will be shown the descriptive statistics from the whole sample.

Table 2.2: Descriptive statistics of the sample

	Monthly stock returns	ESG score	SMB	HML	R_m-R_f
Average	1,05%	49,21	0,29%	-0,45%	1,22%
Min	-56,14%	6	-4,22%	-11,30%	-14,88%
Max	70,63%	92	5,04%	10,76%	17,17%
Standard deviation	0,10	20,62	1,67	2,79	4,88

Source: Author's calculations based on data from Eikon database (2022)

In Table 2.3 there can be seen the descriptive statistics formed from the whole sample. In this table there are shown the average, minimum and maximum value of monthly stock returns, yearly ESG

scores, monthly SMB's, HML's and market benchmark return minus risk-free rate. Also the standard deviations for these are shown. When looking at the monthly stock returns, it can be seen that the standard deviation is very small which means that there is not a big difference between the monthly stock returns between the companies. Also the average monthly stock return is positive in the sample. The average ESG score is 49,21 which is almost in the middle of the scale of measurement since ESG score is measured from 0 to 100. The standard deviation in ESG score is big since there is a lot of variety in the ESG scores between the different companies. The size factor (SMB) has a positive average value when the value factor (HML) gets negative average value. The monthly market benchmark return minus the risk-free rate gets a positive average value in this time period.

Later on there was a need to collect the data from Kenneth French data library for the systematic risk factors (French 2022). In this study in addition to the ESG scores and the average monthly returns there were used the SMB, HML, market return and risk-free rate. Because in this study the Finnish stock market is being analyzed, the Fama-French European 3 Factors model is being implied from the Kenneth French data library. As a suitable risk-free rate, one-month Euribor rate is being used. To adjust the market return, the Euribor rate must be subtracted from it.

2.3. Construction of portfolios

When constructing the portfolios, the first thing to do is to divide the companies in the dataset into three portfolios based on their reported ESG scores. Portfolio H represents high rated ESG companies with an average ESG score between 70-100, portfolio M with ESG scores between 31–69 and portfolio L companies with ESG score less than 30. The number of companies varies depending on the year since at some years the companies ESG scores decreased or increased so that the company shifted into other portfolio. The below Table 2.2 is to demonstrate the number of companies in each of these portfolios.

Table 2.3: Number of companies in portfolios each year

Number of companies	2016	2017	2018	2019	2020	Average
Portfolio H	11	12	17	18	21	15.8
Portfolio M	52	52	47	47	45	48.6
Portfolio L	17	16	16	15	14	15.6

Source: Author's calculations based on data from Eikon database (2022)

As it can be seen from Table 2.3 the portfolio M has the most companies in it during the time period from 2016 to 2020. The average number of companies in portfolio H and in portfolio L remains the same during the time of the study. It is positive that coming to the end of the time period the number of companies in portfolio L decreased and the number of companies in portfolio H increased.

After constructing the three portfolios from all of the companies in the sample, there were also constructed nine industry-specific portfolios based on which industries have the most companies with reported ESG scores. These industry-specific portfolios are formed from consumer services, industrials and technology. Inside these three industries the companies are classified based on their ESG score to portfolios H, M and L so in total there are 12 portfolios in this study. The below Table 2.3 demonstrates how the companies are divided inside these industry-specific portfolios.

Table 2.4: Number of companies in industry specific portfolios each year

Number of companies	2016	2017	2018	2019	2020	Average
Consumer services H	2	2	2	3	4	2.6
Consumer services M	10	10	10	9	8	9.4
Consumer services L	4	4	4	4	4	4
Industrials H	2	3	5	6	5	4.2
Industrials M	18	17	15	14	15	15.8
Industrials L	4	4	4	4	4	4
Technology H	0	0	1	0	0	0.2
Technology M	4	4	3	5	5	4.2
Technology L	6	6	6	5	5	5.5

Source: Author's calculations based on data from Eikon database (2022)

As it can be seen from Table 2.4, the M portfolios have the most companies in Consumer service and Industrials industries. The Technology portfolios are the only ones where there are most companies in portfolio L. Also in Technology H portfolio, there is only one company with a high enough ESG score to be in that portfolio and that company remains in portfolio H only for the year

2018. Technology is the smallest industry included in this study so the results are not as accurate as with other portfolios.

3. ANALYSIS AND DISCUSSION

This section presents the findings of this quantitative study of stock market performance of ESG rated companies. The aim of this thesis is to determine if the companies' ESG scores have an effect on their stock performance in the Nasdaq OMX Helsinki main market listed companies. Firstly descriptive statistics of the sample will be shown. After that the results of the regression analysis are presented.

3.1. Indexed returns and descriptive statistics

The below Figures 3.1, 3.2, 3.3 and 3.4 represent the indexed returns for the high, medium and low ESG score portfolios from the whole sample and for the industry specific portfolios. Remark that portfolio H represents the high rated ESG companies whose ESG score is over 70 and portfolio L represents the low rated ESG companies whose ESG score is less than 30. Portfolio M represents the average rated ESG companies whose ESG score is between 31 and 69. The indexed return is the change in the investment price over the time period of 2016 to 2020. Calculating this it was predicted that the initial investment was 100 euros.

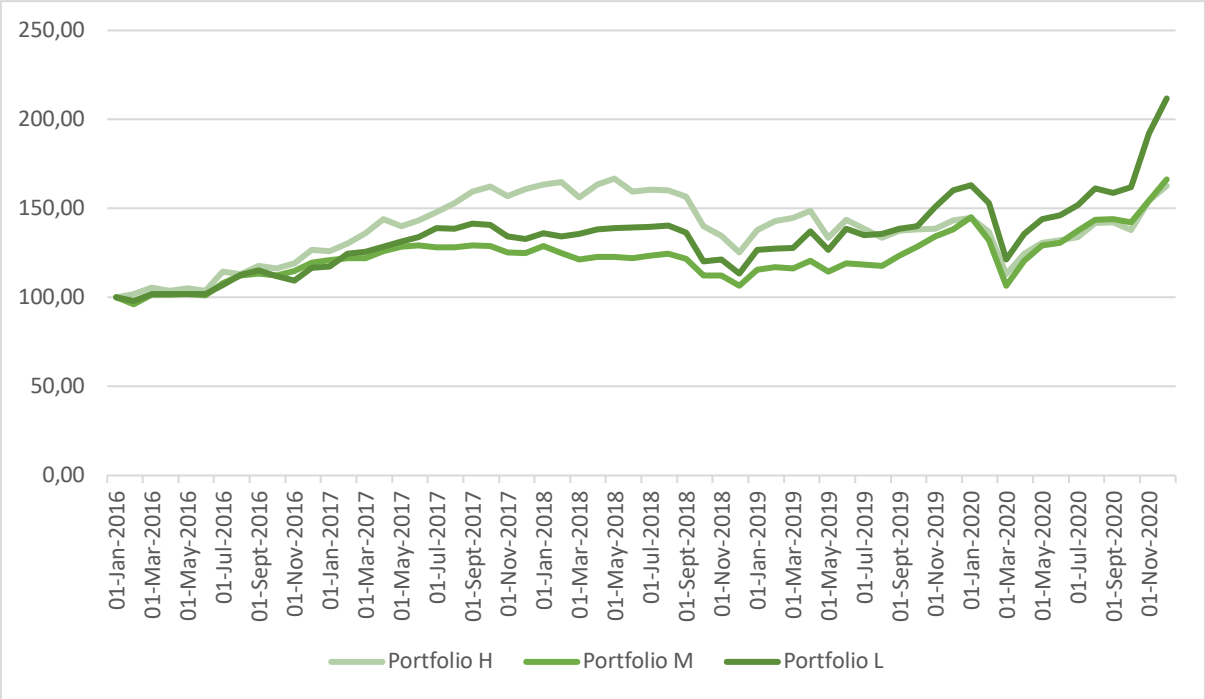

Figure 3.1: Indexed returns for portfolios divided by the ESG score from the whole sample
Source: Author's calculations based on data from Eikon database (2022)

Figure 3.1 shows the indexed returns for high, medium and low rated ESG companies from the whole sample from 2016 to 2020. During this period the indexed returns for the portfolios are 62,59%, 66,32% and 111,80%. As it can be seen from the figure, the differences between the different portfolios are minimal. At the beginning of the time period Portfolio H started to gain the highest indexed returns but overall portfolio L generated the highest indexed return during the period of this study. Also it can be seen from the graph when the Covid-19 pandemic started in March 2020 and the stock prices declined. After that the stock prices started to revive.

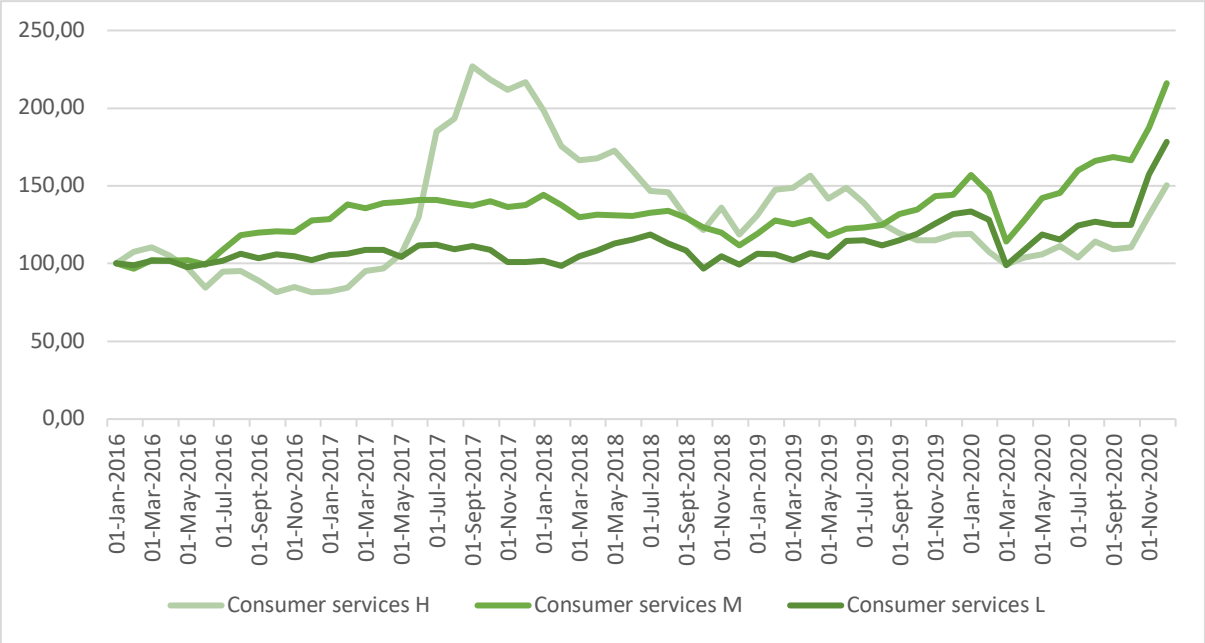

Figure 3.2: Indexed returns for ESG divided Consumer services portfolios

Source: Author's calculations based on data from Eikon database (2022)

Figure 3.2 presents the indexed returns for the ESG divided Consumer services portfolios. During the period from 2016 to 2020 the indexed returns for the portfolios H, M and L were 50,43%, 116,06% and 78,32%. In this graph there can be seen more variety between the indexed returns for each of the portfolios. Consumer services H portfolio achieves the highest price during this time period in the September of 2017 but overall Consumer services M portfolio has the highest indexed return. Also the effect of Covid-19 can be clearly seen from this figure when looking at Consumer services M and Consumer services L portfolios..

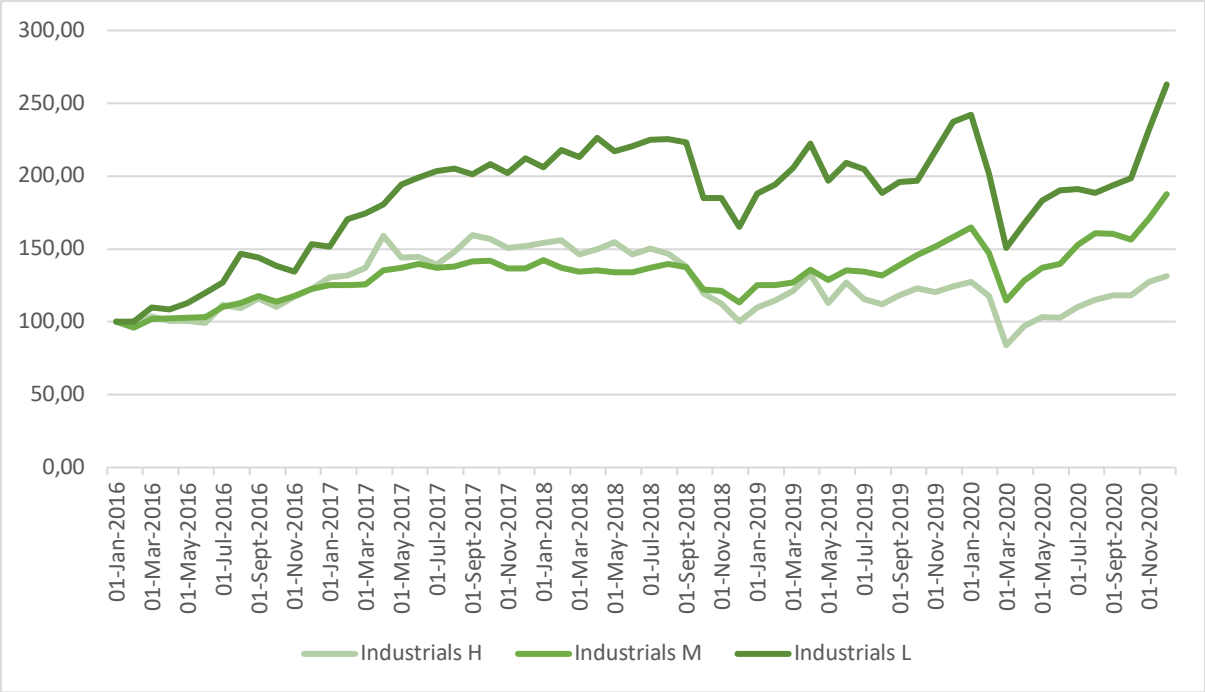

Figure 3.3: Indexed returns for ESG divided Industrials portfolios

Source: Author's calculations based on data from Eikon database (2022)

The Figure 3.3 illustrates the indexed returns for the ESG divided Industrials portfolios. The indexed returns for the portfolios are 31,23%, 87,63% and 162,95%. As it can be seen from the figure, portfolio L has the highest indexed return during the time period of this study. All of the Industrial portfolios react quite similarly during the time period.

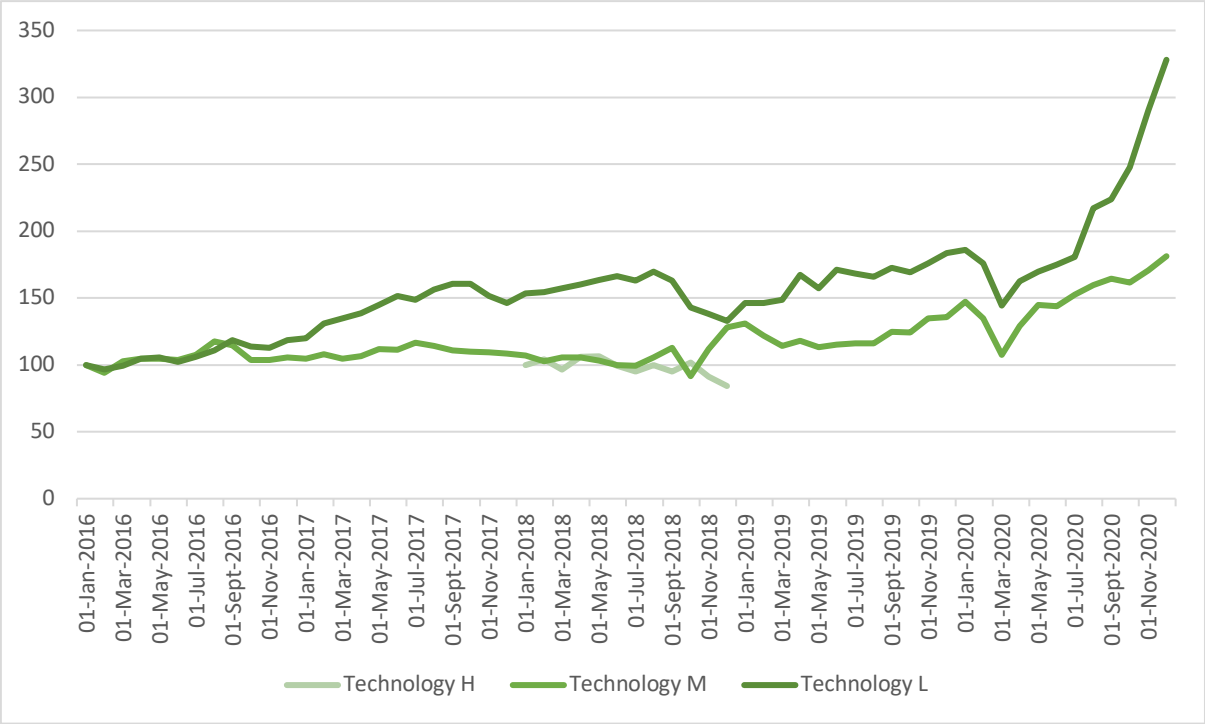

Figure 3.4: Indexed returns for ESG divided Technology portfolios

Source: Author's calculations based on data from Eikon database (2022)

The Figure 3.4 illustrates the indexed returns for the ESG divided Technology portfolios. The indexed returns from 2016 to 2020 are -15,79%, 81,24% and 228,06%. The results of portfolio H can be misleading since there is only one company which received a high enough ESG score to be included in this portfolio and it was only for the year 2018. Technology L portfolio has the highest indexed return during the time period of this study.

According to Figures 3.1, 3.2, 3.3 and 3.4 the industry specific portfolios had the highest indexed returns with a few exceptions. The technology specific portfolios had the highest average indexed returns during the time period. This may be because new technologies are developing all the time which can increase the willingness of investors to invest in technology companies. Overall, the highest indexed returns were in L portfolios where the highest indexed return was 228,06% in Technology L portfolio, but an exception to that is the Consumer services portfolios where the highest indexed returns was in Consumer services M portfolio. The most homogeneous results were in the portfolios constructed from the whole sample by the ESG scores. Followingly there will be outlined the descriptive statistics in Table 3.5 for the portfolios divided by their ESG score from the whole sample and the ESG divided industry specific portfolios.

The below Table 3.5 demonstrates the average historical monthly returns, standard deviations (SD), Sharpe ratios, Compound annual growth rates (CAGR) and the minimum and maximum monthly returns of the portfolios during 2016-2020. Panel A consists of the high, medium and low ESG score portfolios from the whole sample and Panel B consists of the ESG score based industry specific portfolios.

The monthly average return is the arithmetic average of all the returns calculated by taking the average return of all 60 months. The Sharpe ratio measures the risk adjusted return of the portfolios and it is calculated by dividing the average monthly return by the standard deviation. CAGR is the geometric average of the returns indexed to 100 and calculated by the following equation:
$[(1 + r_i) \times (1 + r_i) \times ... \times (1 + r_t)]^{1/t} - 1$, where t=5 years. *(2)*

Table 3.5: Descriptive Statistics of Portfolios in percentages (except SD and Sharpe ratio)

	N	Mean return	SD	Sharpe ratio	CAGR	Min	Max
Panel A:							
Portfolio H	60	0,96	5,16	18,63	10,21	-17,27	12,00
Portfolio M	60	0,98	4,74	20,67	10,71	-19,25	13,15
Portfolio L	60	1,45	5,76	25,10	16,19	-20,71	18,76
Panel B:							
Consumer services H	60	1,15	10,00	11,47	8,51	-12,92	42,75
Consumer services M	60	1,49	5,90	25,23	16,66	-21,74	15,20
Consumer services L	60	1,19	6,42	18,49	12,26	-22,90	26,09
Industrials H	60	0,76	7,61	10,02	5,59	-28,65	15,85
Industrials M	60	1,23	5,54	22,20	13,41	-21,96	11,78
Industrials L	60	1,97	7,89	24,98	21,33	-25,34	16,95
Technology H	60	-0,58	7,03	-8,22	-15,79	-10,47	9,82
Technology M	60	1,27	7,19	17,63	12,63	-20,22	21,83
Technology L	60	2,23	6,35	35,12	26,82	-18,00	20,14

Source: Author's calculations based on data from Eikon database (2022)

Panel A in table 3.5 depicts the descriptive statistics of the portfolios constructed from the whole sample by their ESG scores. As can be seen from the table, portfolio L has the highest Sharpe Ratio of 25,10%, which indicates that the risk-adjusted return historically has been the highest for

portfolio L. When looking at the standard deviation (SD) that measures the volatility of each portfolio, it can be seen that portfolio M is less volatile compared to portfolio H and portfolio L as evidenced with having the lowest standard deviation of 4,74. Also it can be seen from the table that portfolio L has the highest compound annual growth rate (CAGR) of 1,95% over the period 2016 to 2020. The big monthly decreases in portfolio minimum numbers can be explained by the decline in exchange rates caused by the Covid-19 in the spring of 2020.

Panel B in table 3.5 illustrates the descriptive statistics for the ESG divided industry specific portfolios. As Panel B highlights, Technology L portfolio has the highest Sharpe Ratio of 35,12%. The Consumer services portfolios are the only ones with the highest Sharpe Ratio being in other portfolios than in portfolio L, where the highest Sharpe Ratio is in portfolio M. The highest standard deviation is in portfolio Consumer services H where it is 10,00%. The lowest volatility is in the Industrials M portfolio with SD being 5,54. It can also be seen from the table that the highest compound annual growth rate of 2,87% is in the portfolio Consumer services M. The only industry specific portfolio where the highest CAGR is not in portfolio L is in the Consumer services portfolios. Technology H portfolio is the only portfolio with a negative CAGR but the results are misleading because there is only one company in the sample with an ESG score being over 70 in the period of the study.

3.2. Performance of portfolios

This paragraph outlines the results from the regression analysis for the 12 portfolios. Note that Portfolio H represents the high rated ESG companies, portfolio M the average rated ESG companies and portfolio L the low rated ESG companies. The Fama & French model discussed in sub-section 2.1 is utilized in the regression model. Note that Panel A consists of the high, medium and low ESG score portfolios from the whole sample whereas Panel B consists of the ESG divided industry specific portfolios. The dependent variables in the regression are explained in the table notes.

Table 3.6: Results from the regression analysis

	Alpha	HML	SMB	Mkt-Rf	R Squared
Panel A:					
Portfolio H	0.0020	-0.0608	0.4564	0.7929***	0.6606
Portfolio M	0.0016	-0.1521	0.7500***	0.7417***	0.7604
Portfolio L	0.0030	-0.0824	0.6315*	0.9708***	0.7729
Panel B:					
Consumer services H	0.0028	0.2242	0.6426	0.8590**	0.2443
Consumer services M	0.0036	-0.1666	0.9253**	0.8622***	0.6562
Consumer services L	0.0036	0.2706	0.8027*	0.8025***	0.5757
Industrials H	-0.0075	-0.3579	0.8447	1.1006***	0.5516
Industrials M	-0.0001	-0.2672	0.7906***	0.9412***	0.7891
Industrials L	0.0057	-0.0966	0.5209	1.1745***	0.5652
Technology H	0.0149	1.9920	4.6670	-0.1162	0.3723
Technology M	0.0038	-0.1590	1.0987*	0.6460**	0.3138
Technology L	0.0105	-0.1860	0.9728**	0.8796***	0.5915

Notes: *=p<0.05, **=p<0.01, ***=p<0.001

Source: Author's calculations based on data from Eikon database (2022)

When looking at Panel A in Table 3.6 it can be seen that the alphas in this study are positive which means that all the portfolios, regardless of low or high ESG ratings, raise return expectations. Portfolio L has the highest alpha in this study but none of the alphas are statistically significant. These positive alphas describe that a part of the return on these portfolios cannot be explained by the exposure to the market factor. In example, when looking at R Squared in Portfolio L, it indicates that 77% of variation in return can be explained by the Fama-French three-factor model. All the betas in Panel A are smaller than one, indicating that the portfolios are underexposed to the market portfolio. The market factor betas are statistically significant for all portfolios, but Portfolio M has the lowest value, indicating that it is the least sensitive to market movements. This implies that exposure to the market factor is the primary driver of portfolio excess return. This is also true when additional risk factors are taken into consideration, which will be discussed next.

With regards to the Fama-French three-factor model, the results reveal risk premiums with respect to big market capitalization and growth companies. In Panel A, the value factor (HML) gets only

negative values which are not statistically significant for the study. The regression output also shows that size factor (SMB) is statistically significant ($p<0.05$) in Portfolio M and Portfolio L. This illustrates that Portfolio M's and Portfolio L's returns are driven by big market capitalization companies.

When looking at Panel B in Table 3.6, almost all the alphas are positive in these portfolios. Only exceptions to this are Industrials H and Industrials M portfolios. This can be explained by the industrials sectors nature since this sector generates significantly more air pollution and emissions than the other industries in this study. According to the results of the analysis, it varies a lot is the highest alpha is in high, medium, or low portfolio. Market factor is statistically significant in every portfolio except in Technology H portfolio, but as mentioned earlier, Technology H portfolio consists of only one company which is included in the portfolio for only one year. The highest market factor value is in Industrials L portfolio, which indicates it to be most sensitive to market movements. The least sensitive to market movements in Panel B is Technology H portfolio.

As Panel B illustrates with regards to the Fama-French three-factor model, the value factor (HML) factor gets negative values in every portfolio except in Consumer services H, Consumer services L and Technology H. The HML does not give statistically significant values in any of the portfolios. The SMB factor gives statistically significant values in every industry's medium and low portfolios except in Industrials L portfolio. Therefore, being responsible seems to not play an important role when looking at the different portfolios.

3.3. Discussion

The results from the indexed returns showed that the low ESG score portfolios generated higher returns than the medium or high ESG score portfolios. Only exception to this was consumer services portfolios where Consumer services M portfolio generated the highest indexed returns. This result can also be seen from the descriptive statistics table, where the mean returns and compound annual growth rates are the largest in the low ESG score portfolios. This can be explained by the fact that high ESG score companies might use larger amounts of money to make environmentally friendly choices to remain in the high ESG score class which will affect the companies profit.

Overall, the results shown in regression analysis show that there is no significant difference in performance between highly rated ESG companies in comparison to low rated ESG companies. One reason is that the alphas in the regression analysis do not get statistically significant values in any of the portfolios. According to the results of the regression analysis, there are no major differences in the alphas between the high ESG rated and low ESG rated portfolios which results that the level of responsibility has a very small effect on portfolio returns.

According to the regression analysis, the portfolios obtain statistically significant results at the 0.01% significance level for the market factor. This finding is in line with the study made by Li et al. (2018), which states that portfolios built based on responsibility classification behave quite consistent with market portfolio movements. When the market is in an upturn and the returns on the market portfolio change, the portfolio returns in this study also reach sensitively to changes. However, it is unclear in the results how much of the return based on the ESG rating is explained by responsibility, and how much of it is explained by the upturn in the stock market alone.

CONCLUSION

The study focused on the Finnish companies stock market performance and their ESG scores from 2016 to 2020. The companies used in this study were listed in Nasdaq OMX Helsinki main market and in total there were 12 portfolios created. Three portfolios were constructed from the whole sample by the companies' ESG scores and after that there were three industries chosen by which industries had the most companies with ESG scores in it. All of the industry-specific portfolios were also divided into three portfolios by their ESG scores so in total there were 12 portfolios in this study. The aim of this thesis was to determine if the companies' ESG scores have an affect on their stock performance. The study was made by using the Fama-French three-factor model and the data was collected from the Eikon database.

The research had limitations since many of the Finnish companies listed in the Nasdaq OMX Helsinki main market did not have any reported ESG scores during the time period. Also if the company had only one reported ESG score during 2016 to 2020, it was assumed that the ESG score remained the same for the whole study period. The data also consisted of companies which listed in the stock exchange in the middle of the time period but those were still included in the study to avoid the loss of observations. Due to the limited number of companies in the sample, Technology H portfolio contained only one company for a one year of time which is why it affected the final results disruptively.

There are many previous studies made about whether companies' ESG scores affect their stock performance or not. The results varied between the different studies subject to when the study was made and where it was made geographically. Also the studies differ greatly in what has been used as an explanatory variable for the performance. Generally the previous studies showed that there is no significant difference between the low rated ESG portfolios and high rated ESG portfolios effects on the stock returns.

The findings of this thesis are mainly similar to the findings of previous studies. One of the reasons is that when looking at the alphas in the regression analysis, they do not get statistically significant values in any of the portfolios. Also there are no significant differences between the alphas of high

ESG rated portfolios and low ESG rated portfolios. As a result, it is possible to assert that responsibility has a minimal effect on portfolio returns. According to the regression analysis, the market factor gets statistically significant results at the 0.01% significance level in all of the portfolios relevant for the study. This means that when the market is in an upturn and the returns on the market portfolio change, the portfolio returns in this study also react sensitively to changes. This study leaves open the question of how much of the return on portfolios based on ESG score ratings is explained by responsibility and how much by the stock market upturn.

When looking at the findings from the indexed returns, it can be seen that the portfolios that have lower ESG scores generate higher returns during the time period of this study in comparison to higher ESG score portfolios. This can be explained by the fact that high ESG score companies may spend more money to make environmentally friendly choices in order to maintain their high ESG score status, which will eventually have an impact on the company's profit.

Globally there has been a lot of previous studies made about responsible investing but not many of those are focusing on responsible investing in Finland. For future research an interesting issue could be taking this topic even further and analyzing the individual factors of ESG which are environment, social and government, and their individual relationships to stock returns. This would give more precise results on what is the factor that actually has the biggest effect on stock performance.

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