# UMEÅ SCHOOL OF BUSINESS, ECONOMICS AND STATISTICS

UMEÅ UNIVERSITY

# THE EFFECT OF THE ESG SCORE ON STOCK PRICE JUMPS

## A Quantitative Study on Nordic Countries

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**ABSTRACT**

Sustainability performance of a firm is gaining equal importance as the economic performance in today's world. Sustainability scores or ESG ratings have successfully emerged to be popular sustainability performance measurements for firms across the globe. Therefore, many studies have been done focusing on relating the firms' sustainability performance with the financial performance from different aspects in different regions. Other studies have also looked at the relationship between sustainability performance/CSR/ESG and the risks related to the firms. But no study has been found that consider the relationship between ESG/CSR and more extreme stock price movements, i.e., so called stock price jumps, which is an important part of the total risk. To fill this knowledge gap, this study aims to investigate the relationship between firms ESG score, as well as how separate E, S and G scores, relate to stock price jumps.

The Nordic countries are chosen as the research area as the four Nordic countries, Sweden, Finland, Denmark, and Norway are ranked among the top five countries in terms of ESG ratings for the last two years. Logically, the investors in these countries should be interested in the firms ESG score as well. Data source for this study is mainly the Thomson Reuters Eikon database. In total 105 companies listed in the Nordic Stock Exchanges have been selected as the sample within the time frame 2008-2017. The findings of this study indicate that, there is no statistically proven significant relationship between firms' overall sustainability performance or the ESG score and the number of stock price jumps. However, some significant results have been found at the country level and for individual E, S and G scores however. Therefore, individual environmental, social and governance scores have been recommended to be studied by investors before taking any investment decision if they want to reduce the probable stock price jump risk.


**Key words:** *ESG, CSR, corporate social responsibility, total risk, financial risk, idiosyncratic risk, stock price jumps*

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## DEFINITIONS

Eikon Thomson Reuters database = Eikon database = Thomson Reuters database

ESG = Sustainability measure based on the three main factors Environmental, Social, and Governance

ESGC Score = ESG Combined Score = ESG score + Controversies category

Stock price jump = Extreme movement of stock price over a short period

Nordic countries = For this thesis, the Nordic countries refers to Sweden, Finland, Norway, and Denmark.

Beta = A measure of the volatility, or systematic risk. Beta is used in the capital asset pricing model (CAPM).

Idiosyncratic Risk = Firm specific risk

EMH = Efficient Market Hypothesis theory

Significance level = The probability of rejecting the null hypothesis in a statistical test when it is true. For example, a significance level of 0.05 specifies that there is a 5% risk of concluding that a difference exists when there is no actual difference.

# 1. INTRODUCTION

*This introductory chapter starts with the background of the chosen topic. Thereafter, a thorough discussion about the problem and the research gap will come, which will be followed by the purpose of this thesis and the accompanying research questions. Finally, this chapter will be ended up with the delimitations of the study.*

## 1.1 Problem Background

The evidences of economy globalization have appeared in middle 80's in 20$^{th}$ century and this process continues today (Bran, 2015, p.7). Most of the national economics in the world are not locked inside the country but trying to operate with each other. Hence, global economies depend on cross-border trades and must build infrastructure to support complex supply chain (Heugh and Fox, 2017, p.2). Companies operating in these processes are in conflict relations with environment (Heugh and Fox, 2017, p.2). For example, the situation around environment is so serious that all over the world leaders met in Paris in 2015 to discuss a plan where most agreed to keep world average temperature two degrees below than pre-industrial level and making financial flows towards low greenhouse gas emissions (United Nations, 2015, p.3). Even though Paris agreement was signed by countries but not companies, companies would have to or would be forced to adapt to this reality.

Sustainability and how to deal with this term are the most talked about and current topics among all the segments of society. There are many studies continuously showing the proof of the increasing bad implications on our life, our working conditions, as a whole on our planet. The awareness regarding the negative effect on the environment and human life are rising. As a result, people are becoming more concerned and putting pressure on corporations and governments to address these issues. As an effect of this growing pressure different rules, regulations, and initiatives concerning sustainability are being created from both the regulators aspect and the firm's aspect. Corporations are engaging into different sustainability activities by taking care of the society from different angle and they are also trying to build a brand under the sustainable paradigm. Although sustainability affects all the operations of a firm, it has an implication also in the financial area. In the financial area several new terms such as sustainable finance, sustainable investment, green investment, green bond has been emerged to be able to address the problematic issues related to sustainability.

In the year of 2000, The United Nations Global Compact (UNGC) was founded and a framework consisting of ten principles regarding the environment, human rights, labor and corruption has been provided by the United Nations (UNGC, n.d. b). The UNGC was founded to find a way to solve the raising problems related to sustainability issues and at the same time to encourage the corporations to take sustainable initiatives within their area of operations. Even though this was based on a voluntary framework, still more than 9,000 companies of 161 countries worldwide (UNGC, n.d. a) have agreed to implement and follow the UNGC's sustainability goals.

United Nations (UN) took another attempt to attract investors toward sustainable investing named Principles for Responsible Investment (PRI) in 2006 (Schroders, n.d., p.10). Unlike UNGC, this initiative aimed to focus on encouraging investors to ensure responsible investments instead of pressurizing firm's operations. The PRI initiative managed to gather 1,800 signatories which represent around US$70 trillion and this

numbers allowed them to be the world's leading proponent of responsible investment (PRI, n.d. a). To define the term responsible investment, they state that the Responsible Investment is "*an approach to investing that aims to incorporate environmental, social, and governance (ESG) factors into investment decisions, to better manage risk and generate sustainable, long-term returns*" (PRI, n.d. b).

The initiatives taken by the UNGC and PRI results into implementing sustainability by an increasing number of companies within their operations. The outcome of these sustainable initiatives turns into different CSR (Corporate Social Responsibility) activities which is also a strategic concern for the firms in response to the requirement of both the investors and the consumers. Under the umbrella of CSR, firms take several voluntary initiatives such as reducing carbon footprints, using eco-friendly products, focusing on re-use and recycle, labor policy improvement, fund donation etc. for the betterment of the society and at the same time boosting the brand value of the firm itself (Albuquerque et. al. 2018).

Eventually, these actions related to CSR help the investors to be able to identify and build a portfolio only filled with the sustainable companies. ESG investing is another term of sustainable investing, where ESG stands for Environmental, Social, and Governance. MSCI, the index provider defined ESG investing as, "*the consideration of environmental, social and governance factors alongside financial factors in the investment decision–making process".* There are some factors such as carbon emissions, corruption, working conditions, data security, renewable energy, human capital etc., those are being considered by the ESG investors while they are considering where to place their investment (MSCI, n.d.). There are a number of databases which rates the companies based on the actions taken by the firms related to these sustainable factors. The primary purpose of these ratings is to help the investors in identifying the companies which are sustainable. These ratings named the ESG scores, are the measure that indicates to what extent a firm has implemented and are working with the sustainability aspect including all these factors.

ESG issues became eminent after companies changed their mindset and changed the idea that business is ruled only by money. As it was said, the idea was forced by UN in 2006 where "Principles for Responsible Investment" initiative argued that investors should focus on sustainable and long-term investments. ESG rating or the ESG scores from this point of time started to act as a signal for the sustainable investors. Such as bonds, ESG performance can be rated from best (AAA) to the worst (CCC) (MSCI, 2018, p.11). The interesting fact is that the ESG scores cover not only environmentally friendly matters, but also other problems such as human capital development, corruption, data security and many others (MSCI, 2018, p.4).

The ESG scores nowadays has become a widely accepted and commonly used tool to measure the sustainable performance of the firms. According to the Global Sustainable Investment Alliance (GSIA) investors generally use several different strategies to identify their desired firms to invest in. According to GSIA, using the ESG scores as a basis of investment decision is the second most used strategy. By considering the influential power of sustainability works that results into the ESG scores, it is clear that the sustainability rating is playing a very important role from both the investors and the firms' perspective. That is why there are many studies being done relating to firm's sustainability performance or the CSR activities or the ESG scores with different other control variables, such as organizational performance, risk management, financial

performance, stock returns etc. (Eccles et al., 2014, Velte, 2017, Chen et al., 2016). Those studies tried to find out the relationship between sustainability performance done by the corporations and other variables.

From an investor's perspective, investors do portfolio choices by considering several factors. According to the traditional portfolio choice model like Markowitz (1952), investors only look at the expected return and risk when choosing a portfolio. Thus, one central aspect that investors look for is risk. Risk can be measured with the volatility, i.e., the standard deviation, of the total return. Part of the risk is the extreme movements in the total return which can also be related to the literature of stock market jumps. Investors nowadays do not only care about expected return or risk. They also might care about something else. Such as, doing sustainable investments which is a new field of finance where investors also care about the non-return aspects of their investments (Gates, 2013). Which is why, sustainability works of a firm have been found to have significant impact on firm's performance from various aspects. Stock market performance is one of those aspects in which the sudden movement of stock price can be named very specifically. In other words, the ESG scores might create substantial impact on stock price which might also cause "stock price jumps risk" in both positive and negative way.

Now, what is a stock price jump? By definition, it is more extreme stock price movement over a short period of time (Ferriani and Zoi, 2017). These price jumps can be caused by different reasons. Several studies tried to find out the exact reason behind triggering stock price jumps and came up with very different results. By putting together all of them it can be said that, if there is any related information comes up suddenly, can cause stock price jumps (Ferriani and Zoi, 2017). It can by any kind of news related to the firms traded in the financial market or even related to the country as a whole. The ESG scores might carry the weight to be able to affect the probability of triggering stock price jumps. High ESG scores may result into the positive jumps in stock price and on the contrary low ESG scores may result into causing negative jumps in stock price. Therefore, it is an issue or risk that is creating tension in investors mind about losing their investments (Ait-Sahalia, 2004).

Sustainability is an issue which has a rapid growth and stimulus in every aspect of business and economy. Investors, consumers, general people, everyone is becoming aware of being sustainable in each possible way. Therefore, firms are now being forced to disclose their sustainability score or the ESG scores to public and according to Unruh et. al. (2016), investors take the ESG performance more seriously than the CEO's of the firms seem to believe. That is why an obvious effect is expected to be seen on sudden stock price change because of ESG performance of respective firms. In theory, ESG has a chance to reduce price jumps problem, but as a fact there are not enough studies done to have a clear picture about the suspected implication.


## 1.2. Problem Discussion

The growing interest of public in sustainability awareness issues is continuously putting pressure on the corporations to consider the sustainability performance no less important than the financial performance. This implies that the situation is changing from both inside and outside of the organization which leads to introduce the EU-law for large companies that demands some particular reports to be submitted by the companies regarding sustainability issues (European Commission, n.d.). Though these laws have

been introduced very recently, many companies understood the importance of this matter and started to publish sustainability reports voluntarily.

As said before, the pressure of being sustainable on the companies not only just come from the public nowadays, it has also become a considerable issue for the investors as well (Gates, 2013). Due to this fact, ESG rating has become the identification of sustainable investment for the investors who look for it. There are several agencies that rate the companies based on their ESG performance. According to RobecoSAM (2018), Sweden, Denmark, Switzerland, Finland and Norway are the top 5 countries in sustainability ranking published on November 2018. Four of them are among the Nordic countries. By considering this ranking it is clear that the government and the people of these countries are very conscious about the sustainability issues as they are constantly doing very well according to the criteria of the ESG scores.

It is not only the respective government of those countries that are involved in maintaining sustainability. Individual entities are also concerned about implementing sustainability into their operations in each possible way. Nasdaq Stockholm for example, was the first stock exchange in the world who introduced a sustainable bonds market. Beside this, in 2017 Nasdaq Stockholm also started to recommend the companies to report on their activities or initiatives related to environmental, social and governance (Höiseth, 2018). The CEO of Nasdaq Stockholm, Lauri Rosendahl had an interview with Dagens Industri (Höiseth, 2018), where he stated that, companies are increasingly being pressurized by the investors to work sustainably and eventually a day will come when all the investors will only go for sustainable investments. He also believes that, sustainable work will bring a competitive advantage for the companies. Nordic stock exchanges have already come a long way in the path of introducing sustainability but still needs to keep driving and motivating the change that will lead towards a more sustainable financial market, as stated by the CEO (Höiseth, 2018).

Furthermore, finance is experiencing a small but significant revolution at the same time when UN and PRI are continuously trying to evolve the business and the society with sustainability. A result of that revolutionary change resulted into remarkable increase in the Environmental Social and Governance (ESG) investing. Integrating ESG with all other investment strategies is stated to encompass 10.37 trillion USD as stated by Global Sustainable Investment Review (2016). Not only that, the total number investment in socially responsible projects has increased by 25% between the years 2014 to 2016, the exact number of which is $18.28 to $22.89 trillion (Global Sustainable Investment Review, 2016, p. 7). The definition of ESG integration according to the GSIA is "*the systematic and explicit inclusion by investment managers of environmental, social and governance factors into financial analysis*" (Global Sustainable Investment Review, 2016, p. 6).

According to Sahut and Pasquini-Descomps (2015), the idea of socially responsible investment (SRI) first formed at the back of 18th century where an attempt of excluding some certain sectors such as weapons, alcohol, and tobacco have been found to be ignored in investment decision making process especially for religious or moral purposes. Now this idea gets a modern look where SRI is being done by using numerous positive screening tactics, "best-in-class" approach is one of those strategies. This approach follows ESG criteria as a standard of betterment and favors the companies which acquire better ESG ratings than other companies (Sahut and Pasquini-Descomps, 2015). The concept of SRI has gained more popularity after the financial crisis of 2007. This crisis

left the investors with a shattered confidence level on financial markets and traditional investment policy. The remarkable change happened when it was clearly proved that SRI was safer than others during a dropping market condition (Sahut and Pasquini-Descomps, 2015). Such crisis and consequence made the investors more interested to build a sustainable portfolio to remain safe.

Sustainability activities which is reflected by the ESG scores on behalf of the firms does have impact on firm's performance from various aspects. As stated earlier, several studies have been done to find out the relationship between CSR activities or sustainability works and the firm's performance. Most of the previous researches in the field of sustainable investment are based on exploring relationships between Corporate Social Responsibility (CSR) performance and the firm's financial performance. Year after year several studies have been done to find out how sustainability performance or the ESG scores is affecting financial performance, such as Hillman & Keim (2001), Brammer et.al. (2006), Filbeck et.al. (2009), Rodriguez-Fernandez (2016), Wang & Sarkis (2017) and Velte (2017). The link between CSR and cost of capital is another commonly studied topic by the previous researchers. Literature written by Sharfman & Fernando (2008), El Ghoul et.al. (2011), Chava (2014), Suto & Takehara (2017) are such type of studies. Some studies have found positive results such as Freeman, (2008) and some found negative results such as Brown et al., (2006). Some other studies tried to relate The ESG scores with firms' market performance such as study done by Sahut & Pasquini-Descomps (2015) talks about "ESG Impact on Market Performance of Firms". On the other hand, Celik et. al. (2017) studied the "linkage between company scores and stock returns".

Financial risk is another commonly studied topic. As stated before, Modern Portfolio Theory originated by Markowitz in 1952 provided a model to the investors to consider risk as a component of portfolio choice. The Efficient Markets hypothesis theory introduced in 1953 (Fama, 1970) and then the Capital Asset Pricing Model (CAPM) introduced in 1960, helped to develop and simplify the work of Markowitz regarding MPT (Sharpe, 1964). All these three models are considered to be a part of traditional finance which concerns only about systematic risks. These theories lack the importance of idiosyncratic risk. But systematic risk and idiosyncratic risk both are the components of the volatility or total risk, thus deserve to be considered with equal importance. Sustainability issues or CSR aspects are always related to the company level and as such, if there is any relationship with the CSR and risk should affect the idiosyncratic risk. Early researches done in the field of CSR and risk relationship such as Harjoto et.al. (2017), Mishra & Modi (2013), Lee & Faff (2009), Luo & Bhattacharya (2009) and Spicer (1978) have found mostly negative relations among the variables. While some other researchers found neutral or no relation between CSR and risk such as Humphrey et.al. (2012). A positive relation also has been found by Nguyen et.al. (2015) and Breedt et al. (2018).

As stated above, the number of researches done within the field of sustainability investment are quite a many that enlighten the fact of growing consciousness among the investors and society as a whole regarding sustainability factors which lead the researchers to further dig down every single possible aspect related to ESG. In such circumstances, where the sustainability related activities have been proved to have a large impact on several performance and risk related issues of a firm, then it will not be wrong to say that it might have a significant impact on stock prices too as part of the risk are the stock price jumps.

The results we found on the previous literatures on the ESG and volatility such as Kumar et al. (2016) which says the higher ESG scores tend to lower the risk of volatility leads to a question that, what part of the volatility is decreasing exactly? Is it because the normal volatility decreases or are there fewer extreme movements? Is that what causing the overall results that are seen in the literature? Does it mean that, a bad or good ESG score has direct impact on extreme stock price movements? If yes, then to what extent do availability of the ESG score announcements affect extreme price movements of stock price or in other words, can ESG scores trigger stock price jumps? From the investor point of view should anybody care about the ESG ratings in the fear of losing money in the stock market caused by negative stock price jumps?

All these questions remained unanswered as earlier researchers have not studied the cause of reducing the volatility by further digging it down. To the best of our knowledge, no study has been found that relate the ESG scores to stock price jumps regardless of any geographical area. This is where a big and significant knowledge gap arises that needs to be fulfilled.

## 1.3 Research Purpose and Research Questions

As discussed before, sustainable finance is a growing concern and in response to that companies across the globe have already started to implement and include sustainability into their strategy and operation to a larger extent. Measuring the sustainability works done by the firms has always been a challenge. The challenge of how to present them in front of the investors or in general to the public has been even more so. ESG ratings have come forward as a solution of this dilemma. Nowadays, ESG ratings have become a widely acceptable way of finding out how and to what extent the firms are involved into sustainable works. ESG ratings also offer the comfort to the investors that they have done sustainable investments.

The main purpose of this study is finding out a relation between two main factors. First one is the corporate social responsibility (CSR) works that the firms are doing under the broader term sustainability. Second one is the stock price jumps, which is the extreme change of stock prices within a short period caused by any reason. Relating these two main factors, the main purpose of this research is to investigate, how firm's sustainability activities, or CSR oriented activities are affecting extreme stock price movements. To study this potential relationship, we are going to use a measure of sustainability activity, which is the ESG scores, which is a summary measure of how much of these type of sustainability activities that different firms are doing. We are going to examine that how the ESG scores are related to trigger the stock price movement. In order to accomplish this purpose, we intent to answer the following question which our research question number one (RQ1):

*Does firm's sustainability performance affect the frequency of stock price jumps in the Nordic countries stock markets?*

The secondary purpose of this research is to examine, is there any difference in the impact of different types of sustainability works on the stock price jump? ESG ratings are representing three primary sustainability related issues, environmental (E), social (S) and governance (G). All these three issues have individual rating for each firm. Hence, we would like to find out which of these three main sustainability factors has the strongest

connection to cause stock price jump for the companies listed on the Nordic countries' stock exchanges. Thus, we are also going to investigate the separate effect of the environmental, social and governance factor on stock price movements.

A second research question has been developed to fulfill this purpose (RQ2):

*__Does the E, S and G, components of the sustainability rating individually create different impacts on the frequency of stock price jumps?__*

Results of this study will conclude if higher ESG score of the company would provide less stock price jumps which would mean reduced risk in sustainable investing. For this study we would focus on Nordic region as it is the leading region in ESG performance as well as highly focusing on this area (Porse et al., 2017, p. 3). This would provide more appropriate results and avoid as much as possible accidental growth and falls on stock price market connected with price jumps.

## 1.4 Delimitations

The delimitations have been made during conducting this research are presented below. The purpose of delimiting our study was to make a suitable research in order to produce reliable results on the relationship between the ESG scores and stock price jumps.

- This study is limited to the Nordic market among all the markets in the world. As stated in the previous sections, the reason behind choosing the Nordic countries is their country-wise higher rating in sustainable activities (RobecoSAM, 2018). Which made us believe that, the markets and the investors of these countries might be more concern about the sustainability factors compare to the rest of the worlds and we could expect the reflection of that awareness in the study results. We excluded Iceland even though it also belongs to the Nordic zone as it did not qualify among the top ten countries in the sustainability ranking, therefore creates contradiction with the reason of choosing the other Nordic countries.

- We have only looked at the certain firms among all the listed firms in the Nordic Stock Exchanges which is delimited by the availability of the ESG scores. Not all the firms listed in the Nordic Stock Exchanges have the ESG scores which is one of the basic requirements of being selected in the sample of this study. Which is why the total number of companies included in this study have reduced to 105.

- We have covered the time span of ten years starting from 2008 to 2017. That is how we tried to include the financial turbulence period till the most recent year and ten years have been considered to find out the long-term effect of the ESG score on stock price jumps.

- The ESG data and the historical stock prices except for the trade volume along with other data related to financial performance of the firms have been retrieved only from Thomson Reuters Eikon database.

- We have excluded financial institutions from this study even though they have the ESG scores based on the findings of the previous study. Financial institutions have been previously found to provide ambiguous result because of their different business model (Friede et al., 2015, p. 220).

- We have also disregarded the time lag of +1 year which might have shown some lagging effect 1 year after the ESG scores have been announced. This has been done as we do not know the exact date of announcing the ESG scores and we are covering a long period. Thus, not including time lag should not be an issue to create any significant difference.

# 2. SCIENTIFIC METHOD

*In this chapter we discuss our choice of the subject and preconceptions. Also, we are going to introduce our philosophical standpoints where we will discuss about our ontological and epistemological stances. After that we will discuss the research approach and research design for this study. In the end, we discuss ethics in Business studies and explain the process of literature review.*

## 2.1 Choice of the Subject

Both the authors of this study were interested in the finance as well as sustainability. Before the final decision was made, we discussed different topics that were related to our preferences. After consulting with our supervisor, we had to choose between green bonds and ESG performance. Green bond is a brand-new area, hence looking for previous studies would be a challenge for us. Therefore, we have decided to study the impact of ESG performance on stock price jumps. The primary reason for choosing this, was the topic itself. It was new, relevant and interesting. In addition to that, we had interest on stock price and what can cause extreme change in stock price movement, seems fascinating to us. In addition to that, we are studying in Sweden, which is one of the five countries in Nordic region continuously achieving high scores in terms of ESG performance. Also, ESG score and stock price information is expected to be available in open sources which would make our study much easier than green bonds. Thus, this study topic was chosen as it meets all our interests and we want to expand our knowledge about companies ESG performance and its influence on stock market.

## 2.2 Preconceptions

Whichever topic we decide to choose, we would definitely have some preconceptions about chosen topic. One of the authors of this paper is doing Master in Finance, when second did minor studies in Finance. Both authors are interested in sustainability issues and in our case ESG performance is closely related to sustainability. However, both of us didn't work with ESG tools in real company, so our preconceptions are limited with scientific articles and personal values and beliefs regarding sustainability issues.

## 2.3 Ontology

Ontology can be explained as a philosophical view in research that represent how the study deals with reality. To be exact, ontology is closely correlated with research question and illustrates if social entities need to be considered as objective or subjective (Solomon et al., 2018, p. 2). According to Solomon (2018) it is essential to identify ontology in the beginning of the research process as it will make an impact on choice of research design which affects research strategy, data collection and analysis.

Ontology has two stances that can make an impact on how the study would be organized: objectivism and subjectivism (Bryman & Bell, 2015, p. 32). Objectivism claims that social and business entities are external to actors (Solomon et al., 2018, p. 2). Generally speaking, objectivism in the study means that researches cannot make any influence on the results with their own opinions, views and beliefs about studied object. Thus, objectivists believe that world is external and there is only one reality (Al-Saadi, 2014, p. 3). Objectivists in most cases would choose quantitative study (Marsh & Furlong, 2002, p. 23) by creating hypothesis and testing them. However, there are some criticism about objectivism that can be divided into two groups. First, argues that objectivism

misunderstand how science really proceed (Marsh & Furlong, 2002, p. 23). Second group of arguments claiming that there is an obvious difference between social and natural phenomena which makes social science impossible (Marsh and Furlong, 2002, p. 24).

Subjectivism is totally opposite to objectivism and represents philosophical standpoint where researcher included in studied phenomena (Solomon et al., 2018, p. 3). Subjectivists stay open to new knowledge during the study and develop existing knowledge they had before study. This approach is dictated by belief that mankind can adapt and that nobody can get any prior knowledge of time and context bound social world (Solomon et al., 2018, p. 3). Hence, subjectivists are focusing on understanding of human behavior rather than predict reasons and effects. Therefore, subjectivism refuse to recognize anything that called absolute in this world arguing that all facts are based on human perception (Al-Saadi, 2014, p. 4). In studies based on subjective standpoints researchers are often trying to describe phenomena via interpretation participants opinions.

We believe that our study is following objective standpoint meaning that we as researchers are external from social and business entities. As a result, we would conduct qualitative study where we would build a theory based on previous studies and test it. From our topic and research questions can be seen that we want to test hypothesis that ESG can somehow affect number of stock price jumps. From our ontological perspective, ESG scores and stock price jumps acting independently from social actors. Thus, results of this study are totally depending on situation on stock price market which we cannot affect anyhow. Hence, this study is following objective philosophical standpoint.

## 2.4 Epistemology

Epistemology can be explained as the relationship between researchers and study (Solomon et al., 2018, p. 3). The main idea behind epistemology is to define how we study our reality and what is acceptable knowledge in this reality. There are four main flows of epistemology: positivism, realism, interpretivism and pragmatism (Saunders et al., 2009, p. 113). The choice of epistemological standpoint is positively correlating with chosen ontological standpoint.

Both realism and positivism are following the logic of natural science (UKEssays, 2018), but they have different approach in interpretation of natural science. The difference between positivism and realism is connected with "observation". Positivists make a research where they test theories without observation making verdict "true" or "false" regarding the tested theory. Meanwhile, realists are trying to understand which mechanisms lying under observable phenomena. When it comes to interpretivism and pragmatism, interpretivism claims that there is a link between researcher knowledge and observed object, so it is impossible to separate them (Dudovskiy, n.d., a). On the other hand, pragmatism supports the idea about multiple realities that can explain the world rather than single point of view (Dudovkiy, n.d., b). Thus, according to Saunders (2009) pragmatism and interpretivism are closely connected with subjective ontological view; meanwhile, positivism and realism correlating with objective ontological standpoint.

In this study we will distant ourselves from any influence on results of the research. Thus, from epistemological perspective, our study is following positivism position. This is possible as soon as our study is free from any kind of consciousness (Al-Saadi, 2014, p. 2). In our study we are going to use statistic data that independent from any person as well as ESG performances that are evaluated by exact criteria. Thus, we will focus on

law-like generalizations by observing interaction between ESG performance and stock price jumps making facts as a result of our study.

## 2.5 Research Approach

According to Saunders (2009) there are three possible research approaches: deductive, inductive and abductive. Deductive research approach means that we would build a theory and hypotheses to test them whether they are supported or not (Saunders et al., 2009, p. 124). Inductive approach is following the idea of collecting data and developing new theories from collected data analysis (Saunders et al., 2009, p. 124). Abductive research approach is considered to be mix of inductive and deductive research approaches. We would discuss every approach slightly deeper below in order to provide clear argumentation of chosen research approach for this study.

The purpose of inductive approach is to better understand the nature of the studied problem (Saunders et al., 2009, p. 126). So, the idea of the inductive approach is to collect qualitative data in order to propose a theory. Usually this kind of data is collected via interviews with open questions. Study that use inductive approach is more concerned with context in which phenomena taking place, so smaller sample for this research small sample of experts can be better than use large number of participants. According to Saunders (2009) inductive approach allows us to understand the way how people interpret their worlds. It might provide a better understanding of studied object than what offers deductive approach. Usually, deductive approach provides link between variables, when inductive approach allows us to listen to alternative explanations (Saunders et al., 2009, p. 126). From one side, researchers have wide opportunities in the data collection process. On the other hand, the more information you have to work with, the easier to make a "mistake" or not to notice important information. Thus, inductive approach can provide a better understanding about the context and suitable for new areas with lack of studies, but the threat is use unreliable data in theory developing process.

As it was mentioned earlier deductive approach involves the process of developing theory that would be tested within a study. According to Saunders (2009), deductive approach has several characteristics. First of all, explanation of relationships between variables (Saunders et al., 2009, p. 125). For example, by studying ESG performance of some companies we can notice that the higher ESG performance is, the lower probability for company to face with its stock price jumps. Then we develop a theory that there is a direct link between ESG performance and stock price jump. Afterwards we build a hypothesis and test it. But results of the study can be different for every company, country, region etc. Thus, we require to implement further essential characteristics that will allow us to test hypotheses (Saunders et al., 2009, p. 125). These variables would prove that low frequency of stock price jumps is dictated by ESG performance, but not by other possible variables. Another characteristic of deductive approach is telling us that researcher should be separated from what he observes (Saunders et al., 2009, p. 125). It is not problematic if researchers are using data that is unaffected by other people like the frequency of stock price jumps on the market or ESG score performance. Also, researchers can use closed questions in questionnaire if they need to interact with people in order to test hypotheses. In addition to that, for deductive approach is important to enable our data to be measured quantitatively (Saunders et al., 2009, p. 125). When it comes to our study, ESG performance of the company is measured by ESG score which represents exact number as well as we can count the number of stock price jumps for every company. This quantitative data can be used to measure performance of every company what makes their

performances comparable. The last characteristic is called generalization (Saunders et al., 2009, p. 125). In this study we are going to study the Nordic region which includes such countries like Sweden, Norway, Finland, Denmark and Iceland. However, Iceland is excluded due to not making it to the top 10 countries in ESG score performance rating according to RobecoSAM. According to this characteristic, the results of our study are only suitable for the Nordic region and cannot be applied for any other region without additional study.

Abductive research approach represents the mix between inductive and deductive approaches. This approach is the most advantageous (Saunders et al., 2009, p. 126), but to make this study properly it consumes a lot of time. With abductive research approach researchers not only studying the context of the phenomena and proposing a theory, but also are testing own theory using both quantitative and qualitative data.

In our study we are going to test the link between the ESG performance of the firm and the number of stock price jumps it can cause, both positive and negative. Hence, after taking a deeper look on every research approach we conclude that the most suitable approach for us in this study is deductive research approach.

## 2.6 Research Design

Chosen philosophical perspective in the study dictates us which research design are we going to use (Kumar, 2014, p. 103). Research design can be qualitative or quantitative. Quantitative research design is often associated with any data collection or data analysis process (Saunders et al., 2009, p. 151) that produce or use numerical data. Meanwhile qualitative research design is associated with the same processes but without any numerical data. Further we will discuss both study designs and provide arguments for one which is going to be used for this study.

Quantitative research design usually specific for every study and is always tested for its validity and reliability (Kumar, 2014, p. 103). Quantitative studies are working with numerical data that is usually called quantitative data. Qualitative data is closely associated with positivism and interpretivism, so results have high degree of validity and reliability (Collis & Hussey, 2013, p. 131). According to Kumar (2014), quantitative studies has enough data provided for its replication for "verification and reassurance". Usually, quantitative studies are conducted in order to test a theory with numerical data that excludes personal opinions as much as possible.

The main idea of qualitative research design is to provide an understanding, explanations, clarifications and beliefs connected with studied object (Kumar, 2014, p. 103). Often, qualitative studies are conducted in order to build a theory about the studied object by using interviews or other way to collect people's opinion and believes about studied phenomena. As a rule, qualitative studies are used when there is a lack of information about the studied object.

Thus, in this study we are going to use numerical data in order to find connections between stock price jumps and ESG performance of the company. The data for this study would be taken from open sources such as companies reports or rating agencies. Hence, we are not required to make interviews or anything else that would provide us believes and values. In this study we are not going to understand the nature of price jumps and ESG performance, but we want to test the hypothesis that ESG performance of the

company triggers stock price jumps and the extent of jumps. Overall, we would use quantitative research design to answer our research questions.

## 2.7 Ethics in Business Research

Ethical behavior in research study usually represents appropriate attitude towards our studied object (Saunders et al., 2009, p. 183). We as researchers must act carefully with provided data from other organizations or people as well as follow moral standards when we study our object. Those ethical norms and morals can vary depending on countries and cultures, but Saunders (2009) provided several sources regarding to ethics in business research and summarized the most common and relevant ethical issues in the one list:

- We must provide privacy to participants in our study as much as it possible if they wish so.
- Nobody cannot be forced to participate in any study. It must be voluntary decision of participant.
- There should be no harm to be done to participant such as physical pain or stress.
- "Behavior and objectivity of us as a researcher" (Saunders et al., 2009, p. 186).

In this study we would try to follow ethical norms as much as it is possible for us. As, we are going to analyze secondary data, we would not have any direct participants, but use the data collected by Thomas Reuters. Data that we have taken from Thomas Reuters Eikon database does not need any consent from the companies. However, we understand that even using secondary data from open sources we can make harm for studied companies. Nevertheless, we would try to avoid ethical conflicts and if they appear would try to solve them as soon as possible.

## 2.8 Literature Search

In order to receive a deeper understanding of our problem we have gathered scientific articles and textbooks related to ESG performance or stock price jumps. Relevant literatures were searched mainly via Google Scholars. Also, other student studies from Diva Portal were used in order to ease our literature search and get an understanding of what have been done on our topic and to which extend what we study now is relevant and new. To find relevant literature we used keywords such as "ESG performance"; "stock price jumps"; "ESG ratings"; "ESG theories" and others.

# 3. THEORETICAL FRAMEWORK

*In this chapter, the theoretical framework for this study is going to be explained thoroughly. Relevant theories will be discussed starting from the Portfolio Choice and followed by the Financial Risks. Then a detail discussion about the stock price jump risk has been added at the end of financial risk. Then the Efficient Market Hypothesis theory along with the Adaptive market Hypothesis theory has been included to tell how a market should work. ESG performance and ESG rating has been discussed after that to have a better understanding about how the sustainability performance measurement process works. Connecting the ESG and stock price jump is the next part and finally, the main hypotheses which are going to be tested by this research have been presented.*

## 3.1 Portfolio Choice

Portfolio choice is one of the most crucial parts of the investment decision making process where an investor needs to decide what matters to him the most. Traditional theories such as Modern Portfolio Theory (MPT) developed by Markowitz in 1952 guides the investors to think about the risk and expected return while choosing a portfolio. According to MPT model, investors are risk-averse by nature and assumed to choose a portfolio with less risky components. On the other hand, expected return will be taken into consideration if two portfolios have the same level of risk. This is how an investor choose their portfolio. Markowitz's theory also states that, security specific risk can be diversified, but not the market or the systematic risk (Markowitz, 1952).

As stated earlier, the Capital Asset Pricing Model (CAPM) builds on the MPT and was primarily developed by William Sharpe in 1964 in his article named Capital Asset Prices: A Theory of Market Equilibrium Under Conditions of Risk. John Lintner further developed the theory in 1965 in his paper named The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets. The CAPM since then has been widely used in finance. The relationship between the risk level and expected return of an investment is being presented by CAPM. The last part of the CAPM model represents the risk premium which varies depending on different factors such as macroeconomic conditions, geopolitical instability or stability. A positive relation has been shown between perceived risk premium and expected return. For a given security, the higher the risk premium, the higher the required rate of return.

Portfolio choice is important for this study as this thesis is being written from the investors' perspective and they need to know how to build their portfolio and which factors are important to consider. These traditional theories guide the investors to choose the portfolio by considering risk and return factor. However, financial risk has been further divided into different parts which are being discussed in the later parts of this chapter.

## 3.2 Financial Risks

Before starting to write about the financial risks, it is utmost important to know about the source of financial risk. Meaning, where does the financial risk come from? Which why in this section, we are going to start by discussing what is risk and then thoroughly started to describe the financial risks and the different part of it.

Risk has been defined as *"...the volatility of unexpected outcomes, which can represent the value of assets, equity or earnings"* by Jorion (2007) in their book of *"Value at Risk"*. An organization in its lifetime becomes exposed to numerous risks which can generally classified under two categories, business risks and financial risks

Corporations undertake some risks voluntarily in order to gain a competitive advantage and to increase the shareholder value, those risk can be defined as business risks. The *business decisions* made by a company and the *business environment* in which the company operate are the parts of business risks. The investment decision, the choice of product development, marketing tactics and the choice of company organigram are the components of the *business decisions*. Consequently, strategic risks become the part of the business risks. However, the competition and the macroeconomic issues or risks are included in the *business environment* (Jorion, 2007).

Other risks are considered and classified as financial risks. The probability of losses arises from financial market activities are called as financial risks (Jorion, 2007). In general term financial risk can be denoted as the uncertainties of the future which can be resulted into both limitations and opportunities for a firm. According to Horcher (2005), financial risk is the "*likelihood of losses resulting from events such as changes in the market price*".

Horcher (2005) further illustrates that, financial risk is the combined outcome of two factors,

a) Comprehending the probable loss caused by the changes in a rate or price

b) Estimating the possibility of the above-mentioned changes happening

Financial risk management is considered as an economical priority for every firm regardless of industry. Managing financial risks are meant to be resulted into economic value creation by applying different financial instruments to control the risk exposure (Armitage, 2005; Goetzmann & Ibbotson, 2004; Horcher, 2005).

Financial risk can further be divided into sub- categories such as market risk, operational risk, and liquidity risk. Market risk covers the biggest portion of financial risk which is also known as the principal risk (Bodie et. al., 2014). The market risks which can also be further divided into interest-rate risk, exchange rate risk, equity risk and commodity risk. In this thesis we are going to focus on the market risk and to be more specific, equity risk (Jorion, 2007). Equity risk is related to the risk of stock price fluctuations or jumps which is the dependent variable in this study.

Getting back to Markowitz and CAPM theory, we see that they divided risk into systematic and idiosyncratic or firm specific risk or unsystematic risk. Which also shows that, the investor can avoid the idiosyncratic or firm specific risk by diversifying portfolio. The only thing that matters for pricing in CAPM model is systematic risk. But firm specific risks are equally important to be measured and included in the consideration during pricing.

**Volatility to Measure the Risk**

The unpredictability of future returns which is also denoted by "risk" can be measured by using the standard deviation or variance of the return distribution. The most common measure of unexpected outcome is the volatility (Jorion, 2007). Volatility or standard

deviation of a stock is used to measure the total risk exposure or equity risk of a stock price. According to Hull (2009), volatility is the way of measuring the uncertainty of the future stock price movements. Thus, the uncertainty of the change in stock price caused by possible financial risk factors (systematic and unsystematic risk) are being measured by the volatility of the stock. Two broad categories can be identified in the context of stock market, which are systematic risk and idiosyncratic risk. As stated before, both of them are the components of total risk.

Systematic risk can be defined as the influence of overall market that can affect the whole economy. To further elaborate, the systematic risk can be referred as the interdependence relationship between the industry and a market or a system which may affect the entire market index or the industry as a whole instead of affecting an individual firm as a single unit (Horcher, 2005; James, 2008). For example, there are certain risk associated with the stock market itself that cannot be avoided by diversifying the portfolio.

Unlike systematic risk, unsystematic risk or idiosyncratic is all about the specific risks that can be related to the company. While systematic risks are nearly impossible to control, unsystematic risks can be controlled to a larger extent by different risk diversification actions taken by the company (T. E. Copeland et al., 2005; Downes & Goodman, 2006). Despite being highly correlated with each other, stocks are not perfectly correlated, thus allows the investor a chance to diversify the firm-specific risks.

Various things can happen in the market that can cause the volatility in the stock price. Several studies also tried to find out what causes the share price volatility, such as changes in dividends found by Shiller (1981) can create a big change in the share price which ultimately triggers the volatility. Generally, when people measure the volatility, they look at the full distribution to measure the risk.

But there is another way to look at the risk instead of just looking at the full distribution. The total distribution or the total volatility can be divided into two parts, one concern the "normal" volatility of the stock price and the other is the extreme movements of the stock price, which also can be referred to as stock price jumps. A detail discussion about stock price jumps, which is the dependent variable in this thesis, is given below.

**Stock Price Jump Risk**

Stock price jumps have been recognized as a significant part of volatility in the financial literature since the seminal as described by Merton (1976). To understand the main point of this paper it is utmost important to understand what stock price jump is. Sometime the prices of traded assets are subject to have sudden movements which are difficult to describe with the continuous process. In order to highlight their immediate effect on the asset prices such events are commonly referred as "Jumps" (Ferriani & Zoi, 2017). A price jump can also be defined as an abrupt change over a very short period in relation to the broad range of market phenomena over the same period and this change cannot be connected to a noisy Gaussian distribution (Lahaye et. al., 2011; Lee, 2012; Zheng & Shen, 2008).

The periods of financial turbulence generally cause higher volatility on the financial markets and investors have a common tendency to overreact to any sort of negative information (Anderson et. al., 2007). Different studies have been done to identify what causes or triggers price jumps. Commonly, these price jumps are associated with the

"sudden flow of new information" but no certain consensus has been found that clearly states which kind of market events are more likely able to cause this discontinuous price reactions (Ferriani & Zoi, 2017). Different studies show different result regarding what causes the jumps. According to Calcagnile et al. (2015), there is a partial relation between the scheduled news announcement and stock price discontinuities and the occurrence of such incident is largely unpredictable. On the contrary, Bajgrowicz et al. (2015) claims that jumps are rarely found, and they are mostly linked to news announcements.

A study done by Baker et. al (2015) tried to identify the causes of triggering price jumps in stock and bond markets. The study was based on analyzing the previous several years market situation and the authors found out five primary results of causing the jumps for a certain period. First, the Global Financial Crisis (GFC) of 2008-09 shows "…very high counts of daily equity market jumps around the world". They compared this high frequency of jumps to an old great depression time of 1885 for U.S. and they found the similarity of jump frequency between these two periods. Secondly, the developments of US causes trigger to the equity market jumps around the globe, especially during GFC. Development of own region/country within US causes the vast majority of national market jumps. Third, policy news also triggers jumps and according to the study done by Baker et. al (2015), policy news causes about 20-25% of jumps "…in most advanced economies and a larger share in other countries". Fourth, Macroeconomic Performance news and the news about Outlook accounts causes "…23-38% of jumps in advanced economies and less in other countries". The fifth one is the macro news which is found to be the primary trigger for the jumps in the bond market in US (65%). Whereas Macro news and monetary policy news together are accountable for 93% of jumps. Through their study, Baker et. al (2015) have come up with a template (see Figure 1) including all the reasons they have found out.

| Policy Categories | Non-Policy Categories |
|---|---|
| Government spending | Macroeconomic news & outlook |
| Taxes | Corporate earnings & profits |
| Monetary policy & central banking | Commodities |
| Trade & exchange rate policy | Unknown/no explanation |
| Regulation (other than above) | Foreign Stock Markets |
| Sovereign military & security actions | Terrorist attacks & large-scale violence by non-state actors |
| Other policy (specify) | Other non-policy (specify) |

*Figure 1. Jumps by reasons template. Source: Baker et al. (2015)*

Stock price jump has a very significant effect on investors as it may cause sudden loss or gain in a broader range. According to Ait-Sahalia (2004), for the investors the study of jumps is extremely relevant as it is associated with the allocation of assets and portfolio optimization, since a large price movement can cause significant losses and the demand for higher risk premium being encouraged. Furthermore, jumps are important for risk management purposes as well as they can generate fat tails and can create a significant impact on the Value at Risk (Duffie & Pan, 1997). Jumps are also extremely relevant for asset pricing as they are causing market incompleteness by implicating that the risk of the jump cannot be perfectly hedged (Duffie et al., 2000, Eraker et al., 2003).

From the above discussion the importance of knowing about jumps from the investor's perspective is quite intense. And it is still unclear what causes jumps as different studies shows different results. Thus, this paper is going to examine the relationship between the sustainability performance of the firms (through ESG scores) and stock price jumps. As both the parts sustainability and jumps are being considered highly important thus it is necessary to find out whether the ESG score or rating can affect stock price jumps or not and to what extent the sustainability factors or the ESG scores can cause the probable stock price jumps risk.

## 3.3 Efficient Market Hypothesis

The Efficient Market Hypothesis (EMH) tell us what factors that affects stock prices and how the market works.

According to Fama (1970), an ideal market is one which generates reliable signals for available resource allocation. Which means, a firm is able to take a decision between production-investments and similarly investors are able to choose among the securities that denotes the ownership of a firm based on the assumption that the price of the security "fully reflects" all the available information in the market at any given time. That states the definition of efficient market, the market which reflects all available information at any particular time.

Since the early 1970s, among all the social science theories, Efficient market hypothesis (EMH) has meant to be the most controversial even though well-studied theory, as argued by Sewell (2012). The debate continues upon the validity of the EMH among the financial economist, though there are several improvements have been made in terms of quality and sample data including visible development in statistical analysis.

EMH defies a market as efficient if all available information is being reflected by the stock price. Thus, with the increase of efficiency of a market leads to the increase in random sequences of change in the price. The market is the most efficient when it becomes completely unpredictable with following a random walk (Lo & Sheu, 2007).

Considering these attributes of an efficient market, availability of the news of ESG score should also be reflected into stock price, thus creating stock price jump (positive or negative). This theory is going to help to find out how the announcement of ESG score resulted into change in the stock price in an efficient market.

### 3.3.1 Weak-form Hypothesis

All available information of related to trading data such as interest in short period, stock volume, historical prices are fully reflected by the stock price in a weak form of EMH. These types of data are completely accessible to anyone, thus according to this form of hypothesis these data may generate reliable information about the future performance. All technical analysis become purposeless in the weak form of hypothesis (Bodie et al., 2011, p. 375-376; Fama, 1970).

### 3.3.2 Semi Strong-form Hypothesis

Unlike weak-form hypothesis in the semi-strong hypothesis stock price has full reflection of sort of available public information. Other than the trading data, the fundamental information of a firm such as financial statements, products, management quality, patent,

future earnings forecasts, information those are available to the public are also reflected by the stock price here. Technical analysis has nothing to contribute in this kind of market condition (Bodie et al., 2011, p. 376; Fama, 1970)**.**

### 3.3.3 Strong-form Hypothesis

The strong form of EMH is free from the condition of reflecting only the "available" information. Instead, all sort of information is being fully reflected by the stock price. The term "all information" includes not only general information those are available to public but also the information that is only available to the insiders of a firm. No perfect prediction can be made in such market situation as it shows a random change. According to Bodie et. al., (2011) and Fama (1970), the strong form of EMH is quite unrealistic and nearly impossible to match with the real-world view. Rather, this could be used as a benchmark based on which a deviation from the market efficiency could be measured.

### 3.3.4 Critics of the EMH

There are some critics for this EMH theory. According to Bodie et al. (2011), there are several factors work behind not accepting EMH theory widely in the financial markets. Selection bias issue is one of them which implies that, if a portfolio manager manages to find out a technique which may generate abnormal return, there is a high possibility that he or she will not be willing to share that strategy to the public. Therefore, all other strategies those not be able to create abnormal return are being announced publicly. Thus, transparency of the ability of a portfolio manager of generating abnormal return remains unknown. On the other hand, risk attitude of each investor has a great role to play in the financial market (Sewell, 2012). That is why, different investors have different reactions towards a single announcement in a financial market. This issue is not being considered by the EMH theory.

### 3.3.5 The Adaptive Market Hypothesis

The adaptive market hypothesis proposed by Lo (2004), is a modern theory that attempted to reconcile traditional and rather controversial Efficient Market Hypothesis theory with the principles behavioral finance. Behavioral finance theory states that, people are not fully rational actors as by many market and economic theories are seemed to believe. Lo (2004) on the contrary, postulates that, in different situation investor behaviors for example, loss aversion, overconfidence, and overreaction are more consistent with evolutionary human behavior. The result of this behavior leads to the actions such as competition, adaptation and natural selection.

According to the adaptive market hypothesis theory, humans run trial and error process to make best guesses. Failure of one strategy drives an investor to try a different one until finding a one to be successful with. They the investor is likely to try that strategy repeatedly.

According to EMH it is impossible to "beat the market" as stocks trade at their fare values all the time. That is why, buying undervalued stocks or selling stocks for exaggerated prices is impossible. Contrary to the EMH theory, behavioral finance tries to explain the anomalies take place in a stock market through psychology-based theories. By combining both Adaptive market hypothesis attempts to explain investor and market behavior (Lo, 2004).

### 3.3.6 Implications of the EMH and Adaptive Market Hypothesis Theory

To conclude, related to this paper, if the market functions in a strong form of EMH then there is no point of using signaling approach as the impact of ESG score announcements would have already been reflected in the stock price. On the contrary, a market functioning in semi-strong form of EMH ensures that, all the new information related with the sustainability performance of the firm, which is rated and published by ESG score, will have immediate effect to be reflected by the stock price right after the announcement of the ESG rating. Last but not the least, in a market with weak form of EMH, it cannot be clearly said how long it will take until ESG news are reflected in stock prices. However, on the contrary, the adaptive market hypothesis can be a perfect fit for this research. This theory is able to properly reflect the irrational and overactive nature of the human, in this case of investors on trading decisions. Which may lead to cause stock price jumps. Thus, this modified theory is more useful for the perspective of this research. What we see from these theories is that it is only if the information is new then it can cause a stock price movement in an efficient market, for example jumps. If firms ESG activities are already known by the market through other channels instead of the ESG score, then the announcement of the ESG score should not have any significant effect on the stock price.

### 3.4 ESG Performance and ESG Rating

"Corporate sustainability" term has become a buzzing issue over the last few years and the importance of this issue is rapidly increasing. Firms are facing immense pressure to include sustainability within their business policy and strategies (Liesen, 2013). ESG performance or ESG score is the way to measure the performance of the firms in terms of sustainability issues. This measurement technique, particularly the name includes three main factors, Environmental, Social and Governance (Thomson Reuters, 2019). These main factors have several underlying sub-factors such as, waste and pollution, resource used, human rights, health and safety, wages, community etc. The list of different underlying factors of the main three is given in Table 1.

Table 1. Underlying factors of ESG ratings. Source: MSCI (n.d.); PRI (n.d., b); Thomson Reuters (2019)

| Environmental | Social | Governance |
|---|---|---|
| Climate change | Human capital | Bribery and corruption |
| Gas emissions | Labor standards | Political lobbying and donations |
| Waste and pollution | Privacy and data security | Tax strategy |
| Renewable energy | Stakeholder opposition | Board diversity and structure Wages |
| Green building | Employee relations | Business ethics and fraud |
| Water stress | Employee diversity | Management |
| Natural capital | Health and safety | Shareholders |
| Deforestation | conditions | CSR strategy |
| | Human rights | |

There are several different agencies those are evaluating ESG performance and converting the performance into ESG rating. Thomson Reuters is such an agency. Apparently, the rating should work as an indicator for the current and potential investor about how the firm is doing in performing sustainability issues. Unruh et al. (2016) states that, investors presume that there is a strong connection between the sustainability performance and the financial performance of a corporation. Thus, reviewing ESG rating has become a widely used approach before taking any investment decision. MSCI (n.d.) states that, there are mainly three reasons behind choosing ESG rating as an indicator of investment. First, "integration", meaning, investors have a common belief that integrating with the companies who have high ESG rating will result into long-term return and lowering risk. Second, the "personal values" of the investors. As stated before people are more concern about sustainability issues nowadays. Thus, ESG rating has become a way to find out and exclude the companies which are performing against their personal values. Third, the concept of having a "positive impact". During investing investors are comfortable to choose a company from where they can expect a positive result right away. High rating in ESG measurement creates that comfort zone to the investors. Besides, MSCI (2017) also states that, "...ESG Ratings provided valuable information for both systematic risks and stock-specific risks". Thus, it's clear that ESG score has a significant impact on stock price which might cause an abnormal return for the time being.

### 3.4.1 The Environmental Factor

The Environmental factor is the first and probably the foremost factor that comes into people's mind while thinking about the sustainability issues. As stated in the previous list, the factors related to the probable impacts of a corporation's operation might have on the environment has been included under E of total ESG term. Not all the factors are applicable for all companies. It varies based on the types of business. For example, a plastic manufacturing company or an oil company would have more crucial impact on the environment than a financial consultancy firm.

Credit rating agency such as Thomson Reuters used three main categories while rating the firms based on the Environmental factor, those are resource use, emissions, and innovation. For the first category they focus on the company performance and their capacity to reduce the use of resources such as, energy, water and materials. Besides they try to find out if there could be any eco-friendlier solution by doing necessary changes in supply change management policy. On the other hand, for the second category, emissions, they focus on the commitment and effectiveness of the companies to reduce their emissions in the process of production and operation. Lastly, innovation, which is basically based upon the ways a company can go greener, for example by reducing their environmental costs or producing eco-friendly product and processes (Thomson Reuters, 2019).

### 3.4.2 The Social factor

A business operation regardless it's type can create huge impact on the society from various aspects. The Social factor of ESG performance evaluation technique is dedicated to evaluating all those aspects a company might affect their stakeholders from social standpoint. UNGC (n.d.) defines social sustainability as identifying and managing the impact of the corporation's activities on the people in both positive and negative way across the globe. The elements listed under this S factor above clearly states the point of view of having this factor as a sustainability criterion. Product responsibility, Workforce,

Human rights, and Community are to be the main categories while scoring the Social Sustainability of a company (Thomson Reuters, 2019).

### 3.4.3 The Governance factor

Unlike the other two factors Corporate Governance is a system or set of rules and regulations that generally set by the company itself to work as a guideline about the management of the company. Issues such as CSR strategy, corruption, tax strategy, wages are included in the Governance factor. Good corporate governance strategies can lead to be more transparent which ultimately results into lowering the cost of equity, risk, and information asymmetries (Clark et al. 2015, p. 24). Different studies found that companies having bad or poor corporate governance strategies are generally have lower valuation and poor operational performance (Clark et al., 2015, p. 30).

Scoring this Governance factor has also depends on three underlying categories, Shareholder, CSR strategy, and Management. Each category deals with the commitment of the company in adapting best practice, equality while treating the shareholders and the use of anti-takeover devices respectively (Thomson Reuters, 2019).
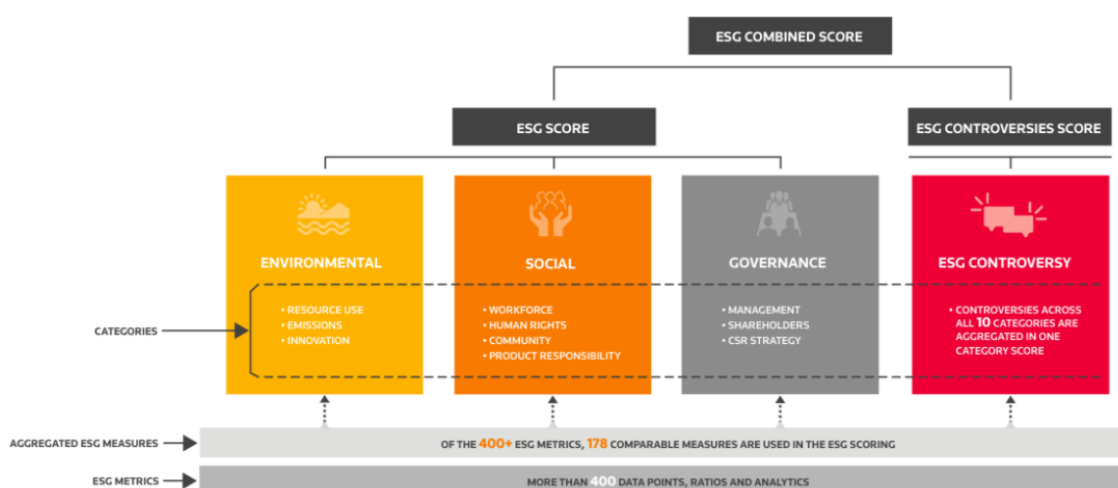


*Figure 2. ESG Score Overview. Source: Thomson Reuters (2018)*

### 3.5 ESG and Stock Price Jumps

Sustainability awareness has become one of the most buzzing topics in this time and being such, firms' activity related to sustainability issues is expected to create an impact on their financial numbers. As we have seen earlier, according to EMH theory new information should affect the price of the stock in an efficient market. Considering this, firms' sustainability performance/CSR/ESG scores might be seen as a new and important information to the market, thus triggering a change in the stock price, which may ultimately lead to stock price jumps.

Signaling theory can help to explain this effect more clearly. According to Spence (2002), signaling theory is primarily concerned regarding lowering the problem of information asymmetry between two parties. Signaling theory has been used by several scholars from different fields of study based on their need. The relationship between information asymmetry and signaling effect has been demonstrated by several financial economists

(Ross, 1973, Bhattacharya, 1979, cited in Connelly et. al. 2011). Announcements by the firms or about the firms lead to various signaling effect in the financial market. Dividend signaling is one of the most familiar examples of this signaling effect concept. For example, if a firm announces an increase in dividend then it results into signaling the financial market of having lucrative projects ahead and it works as a confirmation of generating higher cash flow in the long run (Damodaran, 2001, p. 680-681). Therefore, the announcement of dividend can create both positive and negative signaling effect in the financial market which reflects into the increase or decrease in the share price (Damodaran, 2001, p. 680-681).

Similarly, the announcement of the ESG scores may convey a signal to the market that can affect the stock price both positively and negatively, finally resulting into stock price jumps.

### 3.6 Hypotheses

Before conducting our research model, we should develop hypotheses based on our research questions. When we state our hypotheses, we should state null hypotheses as well as alternative one. In our study we have two research questions:

*1. Does firm's sustainability performance affect the probability of stock price jump in the Nordic countries stock markets?*

*2. Does the E, S and G, components of sustainability ratings individually create different impacts on stock price jumps?*

Based on our research questions, our hypotheses are:

*$H0_1$: There is a significant relationship between the ESG measures\* and the total number of stock price jumps.*

*$HA_1$: There is no significant relationship between the ESG measures and the total number of stock price jumps.*

*$H0_2$: There is a significant relationship between the ESG measures and the number of positive stock price jumps.*

*$HA_2$: There is no significant relationship between the ESG measures and the number of positive stock price jumps.*

*$H0_3$: There is a significant relationship between the ESG measures and the number of negative stock price jumps.*

*$HA_3$: There is no significant relationship between the ESG measures and the number of negative stock price jumps.*

*\* By the ESG measures in this study, we mean ESG combined, ESG, Environmental, Social and Governance scores.*

Moreover, to see to what extend the results for the overall Nordic region can be applied to the Nordic region countries, we will test our hypotheses separately for each country in addition to the full Nordic region.

# 4. LITERATURE REVIEW

*In this chapter, the brief summaries of previous studies are presented. After the brief summaries, we present tables with overview of the results.*

## 4.1 Empirical Studies on ESG and Firm Performance

Despite the fact that people awareness regarding sustainability have started to grow up in early 2000's, even today studies devoted to sustainability issues is more like new trend rather than something usual for us. The importance of such studies has got the utmost importance nowadays that resulted into being one of the four megatrends for research in area of business administration.

The relation between sustainability and financial performance of the firms is quite well-studied as we discussed in the previous parts of this thesis. But still, the impact of the sustainability performance that is reflected by ESG score on the firms' stock price is rather a less explored area. That is why not much literatures have been to study such a crucial relationship that has a huge impact on the investors of the stock market and their decision-making process.

Sahut & Pasquini-Descomps (2015) studied the ESG impact on firms' market performance. They investigated the "…*how news-based scores in ESG (Environmental, Social, and corporate Governance) may have influenced the monthly stocks' market return in Switzerland, the US, and the UK during the 2007–2011 period.*" More than 200 large firms of UK, US and Switzerland were being studied over a five years period. A news based ESG rating was being used in this study. This is a qualitative assessment of ESG performance of the firms based on the ESG reporting in the news media. The data source of ESG rating was Covalence. ESG score computed by Covalence comes from a comparison between the positive and negative information published on internet. Monthly stock's excess performances of different companies of these three countries have been tested by relating to their news based ESG rating. A neutral or slightly negative relationship have been found for the firms of UK based on their overall rating but not for the firms of US and Switzerland. Other results regarding the sub-categories of ESG reflects the fact that *"…the link with such scores and market performance is highly dependent on the year and sector"*. To clarify the authors stated that, *"…investors do not recognize ESG ratings variation as a flag of a lower/higher residual risk, except for periods where the market is sensitive to specific conditions"*.

Another literature by Celik et. al. (2017), "linkage between company scores and stock returns", investigated the relationship between company scores such as Corporate Governance Score, Economic Score, Environmental Score, and Social Score and stock returns. To understand the relationship, they did portfolio level analysis and firm-level cross-sectional regressions. In portfolio level analysis, the authors sorted the stocks based on the individual company scores and built quintile portfolio which includes different levels of company score. After forming quintile portfolios, the difference between existence and significance of raw returns and risk-adjusted returns of the portfolios obtaining extreme company scores has been tested. Additionally, in order to inspect the significance of company scores effects with control variables, cross-sectional regression within firm level had been done. The study included all companies in S&P 500 Index for the period of January 2002 to December 2016. Yearly data of Corporate Governance Score, Economic Score, Environmental Score, and Social Score had been used as

company score while yearly and daily returns, yearly market value (MV), price-earnings ratio (PE), and price-to-book ratio (PB) of all companies had been included in the data set. The findings of portfolio-level analysis show no significant relation between company scores and stock returns, whereas firm-level analysis shows the opposite result that economic, environmental, and social scores have effect on stock returns. Though the significance and direction of these effects may vary with the changes in the control variables in the cross-sectional regression.

Siegelaer (2019) has studied pension funds and how they can implement responsible investing (RI) or ESG investment approaches. Research tries to find if there is a link between ESG investing and higher management and transaction costs. For this study has been used VBDO report which covers 50 largest pension funds in Netherlands. As a result, author has not found any relationships between higher ESG score and higher management and transaction costs. Author suggests three ways for pension funds to invest using ESG. Firstly, move away from traditional management towards ESG active management. Secondly, instead of using traditional benchmarks, pension funds should use benchmarks with ESG filter. Lastly, pension funds should use combination of passively managed assets and active engagement policy.

Fried et. al. (2015), did a second level review study based on over 2000 previous literatures related to ESG factors affecting the firms' financial performance. They included a mix of studies such as vote-count, meta-analysis, both portfolio and non-portfolio-based studies and compiled and compared the findings of all of those in order to get more "generalizable statements".

The results found through the extensive meta-study showed a difference between portfolio based and non-portfolio-based study. According to the result, compared to non-portfolio-based studies, the portfolio-based studies generates more mixed and less positive findings (Friede et al., 2015, p. 220). Moreover, on average, a positive relationship between ESG and CFP has been found across different regions, asset classes, and approaches of studies. However, portfolio-based studies showed abnormal deviating results, thus considered as outliers. According to the neoclassical beliefs of capital markets, the relationship between sustainability performance and firms' financial performance are mostly neutral if not negative, as believed by many institutional investors. To conclude, Fried et. al. (2015, p. 225) stated that, portfolio-based studies are generating misconception regarding the relationship between ESG and firms' financial performance. Thus, their main conclusion was *"… the orientation toward long term responsible investing should be important for all kinds of rational investors in order to fulfill their fiduciary duties and may better align investors' interests with the broader objectives of society.*"

## 4.2 Empirical Studies on ESG and Risk Relationships

If organization integrate Environmental, Social and Fair Governance practices correctly, then it makes company less affected by risk (Kumar et al., 2016, p. 292). However, there are studies which would totally agree with Kumar et al. (2016) and other who would claim that ESG reduces any risk.

Clubb et al. (2016) tried to find relationships between ESG and corporate fixed income. In this purpose they have used Russell 1000 on annual basis which has 1000 largest domestic securities publicly traded and Bloomberg ESG score. According to results of the study, there is a positive relationship between higher ESG scores and low, stable

spreads. However, authors claim that ESG integration may not be suitable for every "green" investor. Also, Clubb et al. (2016) suggest using ESG scores as indicator of sustainability and reduced risk among corporate debt securities.

Duuren et al. (2016) have done a research about the role of ESG in investment processes. They have done it based on international survey among fund managers. They have found that part of participants actively integrates ESG in their investment processes. Furthermore, Duuren et al. (2016) claim that ESG information is used for measuring risks. Authors have also revealed that there is a difference between American and European view on ESG. Among study's results can be mention the fact that among ESG dimensions, governance of the firm is focused by investors as it has closest relationship with quality of management. Furthermore, authors, based on survey, claim that American investors are less optimistic about ESG in term of financial performance, while for European investors ESG performance of the company is more relevant.

Kumar et al. (2016) have studied relationships between ESG factors and investment risk-adjusted performance. For their study, they have used Dow Jones Sustainability Index (DJSI) in order to find 157 companies with good ESG performance. Also, in order to have statistical significance they have randomly selected big number of companies, where 809 of them was not in DJSI. Kumar et al. (2016) have taken in consideration geographical location and market development of every company of the list as well as all companies divided by industries, they are operating in. As a result, companies with higher ESG score have shown lower volatility in every industry. Furthermore, authors come to the conclusion that every industry is differently affected by ESG variables. In addition to in, Kumar et al. (2016) have proven that despite better ESG performance reduces risk and volatility, it is still increasing return in most studied industries. However, for automobiles, durables, banking and insurance industries ESG has a negative impact on return.

Lööf H. & Stephan A. (2019) have studied the link between ESG and downside risk as well as ESG and risk-adjusted performance. For this purpose, authors have studied five European countries: Sweden, France, Germany, United Kingdom (UK) and Netherlands. The period of the study was from 2005 to 2017 and included 887 stocks. According to empirical results of the study, the higher ESG score, the lower downside risk of stock return is. Also, basing on Fama-French three factor model, Lööf H. & Stephan A. (2019) have not found any systematic relationships between ESG and risk-adjusted return.

Hoepner et al. (2017) have studied relationships between ESG shareholders engagement and downside risk. Authors have studied around 296 firms worldwide and have covered period from 2005 to 2014. As a result of the study, authors came to the conclusion that ESG reduces downside risk at portfolio firms that was measured by using lower partial moments and value at risk.

Breedt et al. (2018) have compared two portfolios in their study. The first portfolio was "neutral" which means that it did not follow ESG criteria as well as did not go against them. The second one was "neutral" portfolio that was transformed into ESG positive portfolio. For this study, researchers have used MSCI ESG database that covers around 17 000 worldwide companies from 2007 until 2018. The results of the study illustrate that ESG scores exhibit a large capitalization bias as well as might have developed region bias. Also, authors conclude that ESG as a predictor has a negative correlation with size, but positive correlation with volatility.

Another paper written by Kim at. al (2014), examines whether the corporate social responsibility has any role to play to mitigate or contribute to stock price crash risk. The term crash risk has been defined as "…*the conditional skewness of return distribution, captures asymmetry in risk and is important for investment decisions and risk management*". MSCI ESG data from 1994 to 2008 had been used in this study. These data had been matched against the stock return data of 1995 to 2009 to calculate the one year forward stock price crash risk. Both boom (1995 to 1999 and 2003 to 2007) and burst periods (2000 to 2002 and 2008 to 2009) of stock market had been included in the sample period to get more significant results. The findings of this paper support "mitigating effect" of CSR on stock price crash risk. The authors claim that, in a situation where other predictors of the crash risk are under control, then a negative relationship between CSR performance and future crash risk can be seen. A firm with a less effective corporate governance or inferior level of institutional ownership can be benefitted more by the mitigating effect of CSR on crash risk. The study also proves that, active engagement of a firm in CSR also refrain from "…bad news hoarding behaviour", consequently lowering crash risk.

## 4.3 Empirical Studies on ESG and Biases

In some analysed studies above can be seen that several authors point out the importance of size and geographical location of a company. Thus, we have decided to investigate studies that have mentioned or studied relationships between ESG and company's size and geographical location.

Doyle (2018) have studied rating agencies that implementing ESG scores as he claims that results might vary from agency to agency due to the fact that scores are too subjective. Among problems discussed in the paper was mentioned the fact that there are no rules for Environmental and Social factors as well as there is no audition to verify reported data. Moreover, organizations with higher market capitalization usually receive higher ESG score than companies with lower market capitalization. In addition to it, requirements for higher ESG score might vary from area to area, so two companies doing all the same might have different scores based on headquarter location (Doyle, 2018, p. 5). Author of this study recommends standardize ESG information in regulatory filings to incorporate risk. Also, Doyle (2018) believes that geographical, size and other differences must be adjusted in ESG ratings in order to be less subjective.

Garcia et al. (2017) have done study on ESG performance in sensitive industries. The study has been done in BRICS countries: Brazil, Russia, India, China and South Africa. In order to find the data, authors have used Thomson Reuters Eikon database. Among 1065 possible companies, 365 chosen from industries such as "*mining and construction (19%), manufacturing of food, textile, lumber, publishing, chemicals and petroleum products (18%), Manufacturing of plastics, leather, concrete, metal products, machinery, and equipment (18%); Transportation, communications, electricity, gas, and sanitary services (20%); Trade (9%); Diversified Industrials, Retail and Diversified reits (8%); Personal, business, and entertainment services (4%); and Professional services (4%)*" (Garcia et al., 2017). The period was chosen is from 2010 until 2012. Study results illustrate that even companies in sensitive industries can show high environmental performance in spite of size of a company and country it is located in.

Callahan C. (2019) in his study comparing return of portfolios that consist of companies with high ESG score. However, all companies would be divided on sectors, industries

and stock selection within those portfolios. Thus, author want to see contribution from each of this factor on returns. The period of the study is from 31st March 2014 until 31st December 2018. For this purpose, Callahan (2019) has used FactSet, Bloomberg, Sustainalytics. Firstly, author compared returns between portfolios selecting S&P 1500 Index, top 40%, top 30% and top 20% best ESG score performance companies. As a result, portfolio with top 20% best ESG performing companies has shown the best return equal to 53,30% when S&P Index get 42,67% return. Moreover, Callahan (2019) tried to find a link between sectors and ESG performance. As a result, Info tech, Consumer-D and Industrials had the highest weight in portfolios as well as one of the highest returns. The only sector that has shown negative score in case of return between 2014 and 2018 is Energy sector which return was -41,6%. When it comes to the industries, it can be seen that highest ESG score do not provide highest returns, according to author. Thus, there are sector and industry biases that investor should take in consideration while making portfolio base on ESG performance of the company.

## 4.4 Summary of Previous Research

### 4.4.1 Empirical Studies on ESG and Firm Performance

In Table 2 the findings from the previously discussed empirical studies on ESG and firm performance have been summarized.

Table 2. Summary of previous empirical studies on ESG and Firm performance

| Author (year) | Region | Database | Results |
|---|---|---|---|
| Sahut & Pasquini-Descomps (2015) | UK US Switzerland | Covalence | ESG lowers stock market return in UK, but increase in US and Switzerland |
| Celik et. al. (2017) | worldwide | S&P 500 Index | No significant link between ESG and stock return on portfolio level, but it is on firm-level |
| Siegelaer G. (2019) | Netherlands | VBDO report | Higher score ESG investment does not increase transaction and management cost |
| Friede et al. (2015) | worldwide | Secondary review over 2000 literatures | Portfolio-based studies are generating misconception regarding the relationship between ESG and firms |

### 4.4.2 Empirical Studies on ESG and Risk Relationships

In Table 3 the findings from the previously discussed empirical studies focusing on the relationship between ESG/CSR and risk have been summarized.

Table 3. Summary of previous empirical studies on ESG and Risk relationships

| Author (year) | Region | Database | Results |
|---|---|---|---|
| Clubb et al. (2016) | worldwide | Bloomberg ESG score | ESG reduces risk among corporate debt securities |
| Duuren et al. (2016) | worldwide | Conducted survey | ESG helps to measure investors risks |
| Kumar et al. (2016) | worldwide | Dow Jones Sustainability Index | ESG reduces risk-adjusted performance and volatility |
| Lööf H. & Stephan A. (2019) | Sweden Germany France UK Netherlands | Sweden - SIXRX index Germany - HDAX index France - CACall UK - FTSE250 Netherlands - AEXall | ESG reduces downside risk, but no correlation with risk-adjusted performance |
| Hoepner et al. (2017) | worldwide | Provided by investor | ESG reduces downside risk |
| Breedt et al. (2018) | worldwide | MSCI ESG database | ESG lowers volatility |
| Kim et al. (2014) | worldwide | MSCI | Negative relation between CSR and future crash risk |

### 4.4.3 Empirical Studies on ESG and Biases

Table 4 presents the findings of the previously discussed empirical studies focusing on the ESG and biases from different aspects.

Table 4. Summary of previous empirical studies on ESG and Biases

| Author (year) | Region | Database | Results |
|---|---|---|---|
| Doyle T. M. (2018) | worldwide | MSCI Sustainalytics RepRisk ISS Environmental & Social QualityScore | Companies with higher market capitalization receive higher ESG score. Geographical location matters. |
| Garcia et al. (2017) | BRICS | Thomson Reuters Eikon database | Sensitive industries can perform high ESG despite size and place |
| Callahan C. (2019) | worldwide | FactSet Bloomberg Sustainalytics | Biases exist based on sectors and industry |

## 4.5 Connecting Previous Studies

The literature review above proves that many attempts till today have been taken to find out the significance of sustainability work on firms' performance from various aspects. Studies have been done based on numerous markets and generated differing outcomes and interpretations. The literature review part of this paper includes both primary studies and secondary meta-analyses studies and has been divided into three parts to find accurate knowledge gap and proper platform for this study.

The general findings portray a positive correlation between the ESG and firms' performance. On the other hand, from risk perspective, mostly negative correlation has been found between the ESG and risk factors, even though some studies show neutral relationship. The main reasons behind differing results may be the choice of control variables and the choice of markets that are studied. The method of measuring sustainability is another important factor of causing different results. The Sahut and Pasquini-Descomps (2015) paper for example, used qualitative news-based ESG score and came up with insignificant outcomes. The necessity of using database oriented ESG rating was clear from this paper. However, the ESG ratings provided by different databases have been considered to include for this study. To ensure the comprehensiveness and accessibility of the required data, Thomson Reuters Eikon (former ASSET4) platform will be used in this research.

As ESG score is one of the main components of this study, thus Nordic countries have been chosen because of their higher involvement and rating in sustainability works compare to the rest of the worlds. Though Nordic countries includes five members, the fifth Nordic country Iceland does not show up in top ten ranking done by RobecoSAM (2018). That is why Iceland has been excluded from this study as the same reasoning

cannot be applied for Iceland. By the term Nordic countries, this paper is going to refer Sweden, Finland, Norway, and Denmark.

Furthermore, the above literature review also shows that there are many ways to measure financial performance and risks including conventional ROA, ROE, risk adjusted return, stock market return, corporate debt risk, downside risk, future crash risk etc. But the probability of stock price jump risk associated with sustainability work has been ignored by the previous researchers which may cause a significant loss to an investor in a sustainability sensitive market. A clear knowledge gap has been found here that needs to be filled up through further research within the area. Thus, this study is going to focus on the price jumps, both positive and negative, and the relationship of these jumps with the ESG scores. In addition to that, this study also aims to investigate if the ESG scores can create an effect to reduce the stock price jumps risk as a part of reducing the volatility.

# 5. RESEARCH METHOD

*In this chapter we explain the method of analyzing the relationship between the ESG and the number of stock price jumps. First of all, we discuss population and sample for our study. After that we discuss dependent and independent variables in our model. In the end, we present our regression model which we use in order to find the relationship between the ESG score and the number of stock price jumps.*

## 5.1 Population and Sample

As stated earlier, sustainability as a topic is drawing more attention from various aspects. Which is why a vast amount of research has been conducted revolving around sustainability and the way it is related to financial performance. However, to the best of our knowledge there is no research has been conducted to explore the relationship between the ESG score and stock price jumps in any geographical area. As previously stated, Nordic countries are listed within the top five countries in the RobecoSAM ESG country ranking 2017 and 2018 consecutively. This country-wise ranking motivated us to find out if high ESG ranking in the firm level can create any effect to control stock price jumps, which is certainly a mater to consider if it is somehow related to lowering the probability of negative jumps. Based on this reasoning, the companies listed on the Nordic countries' stock exchanges has been considered as the population for this study.

The four stock exchanges have been chosen to represent four countries which are, Nasdaq OMX Stockholm for Sweden, Nasdaq OMX Helsinki for Finland, Nasdaq OMX Copenhagen for Denmark, and Oslo Børs for Norway. As of today, there are around 800 companies listed on these four stock exchanges. According to the Thomson Reuters database Eikon there are 779 companies listed on the Nordic Stock Exchanges. Screener function of the database has been used to filter the required data. Therefore, all the listed firms have been considered as the population for this study which is 779 in number. Excluding the financial institutions has been one other task to do during sample selection to be in line with the previous literature included in the literature review part of this paper (Friede et al., 2015). According to Eccles et al, (2014, p. 5), financial institutions have different business model compare to other industries and "…*many of the environmental and social policies are not likely to be applicable or material to them.*" Based on this argument financial institutions are going to be cut out from the final sample.

Obtaining Thomson Reuters Eikon ESG scores was another condition for the firms to be selected as a sample. Which is why the companies who have Thomson Reuters Eikon ESG scores for at least three years and listed on the Nordic Stock Exchanges have been selected as the sample for this study. The condition of having the ESG score at least three years has been put to clearly identify the effect of the ESG scores on the stock price of the subsequent years. To exclude companies those do not operate in Nordic region from our list of companies was another challenge to overcome. Hence, we have added column called "Country of exchange" and used filter on it, crossing out companies from other countries such as United Kingdom, Republic of Ireland, Netherlands and others.

Total 137 companies have been found with the ESG score for at least one from Eikon database within the selected ten years of time frame selected by this paper. The number has been reduced to 105 when the financial institutions have been excluded and only the firms having ESG score of at least three years or more have been selected to be included in the final sample for this thesis. Finally, we have left 105 companies those operating in

one of chosen countries and have both financial information and the ESG score available. Appendix 1 contains the list of the companies included in the sample. Regarding the sampling method used in this thesis, the technique we used does not really fit the definition of probability sampling. Rather it can be matched with the definition of convenience sampling to some extent which is technically non-probability sampling method. As we described above, our process started with selecting the population, then we started to exclude the companies based on our requirements. Which is why we did mention the whole process under one single sampling method as it would be wrong to do that.

From the year of 2008 to 2017, total ten years have been selected as the time series for this paper. The time ends at 2017 by considering the availability of latest financial data. The span of ten years has been chosen to study the effect of ESG score on stock price jumps. However, we could take more or fewer years into consideration but the availability of the ESG scores for firms has been increased in the recent years which motivated us in choosing these ten years of time span. As stock price jumps are unpredictable by nature and can be a reflection of any sort of event thus, a study of consecutive ten years will help to understand if ESG score does have any real effect on stock price jump or not.

## 5.2 The Number of Stock Price Jumps as Dependent Variable

The number of stock price jump is the only dependent variable in this paper which we wish to find out to be impacted by the sustainability scores or ESG scores. In addition to that, to answer the research question which is if high score can help to lower the probability of negative jumps or on the contrary the high ESG score can influence the probability of positive jumps, we needed to find out a method of identifying jumps and at the same time both positive and negative jumps.

There are some literatures who described some methods to identify jumps. Maheu & Mccurdy (2004) talks about news effects, normal volatility and jumps as components for individual stock returns. In this paper they try to establish a model illustrating the "*…the conditional variance of returns implied by the impact of different types of news*" (Maheu & Mccurdy, 2004). They found out two separate components called normal news and unusual news events to have *"…different impacts on returns and expected volatility for individual stocks"*. The impacts of unusual news events which can cause infrequent large movements in returns are labeled as jumps. They have developed a GARCH-jump model where GARCH model has been used as a component for the normal volatility and unusual news event as a component of causing conditional jump (Maheu & Mccurdy, 2004). Another paper written by Huang & Tauchen (2005) examined several jump detection models developed by other researchers previously. They have mentioned the drawback of every model and tried to find out a unique solution for the detecting jumps by backing up the shortcomings of one model through another one. Finally, they aimed to check the robustness of a "generic jump test" on financial price data with very high frequency (Huang & Tauchen, 2005). The authors concluded that z-tests for jumps performed well in identifying jumps in ratio form.

Both the papers described their own model to identify jumps with a common basis which is, they separated normal volatility from extreme events by using their own way of calculations. Despite of this those literatures were not enough to serve the purpose of this paper. For this particular study we need to know the number of jumps within a particular time frame and additionally number of positive and negative jumps took place at the same

time. Those papers do not say anything about how to identify positive or negative jumps. Thus, we needed to build our own method to identify specific jumps and separate them between positive and negative jumps. The method we built is based on the same type of underlying intuition described by those papers which is there is a normal volatility and everything outside that normal volatility we consider as jumps. The only difference with us is that we estimated normal volatility in much simpler way and identify jumps in more straightforward way.

We tried to devise our own way of finding jumps by estimating normal volatility which is the two standard deviations of returns and then everything outside that value, we defined as jumps. So basically, we divide the volatility in two parts, one is normal volatility and we approximate that normal volatility by simply with estimating standard deviation. Furthermore, we calculated specific volatility for each year as normal volatility can change year to year. Then all changes in returns, both positive and negative, those are outside of this normal volatility, which is two standard deviation of return, we identified as jumps.

Our method is built on the same intuitions as the previous literatures mentioned above but it allows us to identify jumps at specific dates. Moreover, it allows to count the number of jumps during a year and in combination with return this method allows to see which one is positive and negative.

## 5.3 Independent Variables

### 5.3.1 ESG Score

To be more accurate answering if ESG score affects number of jumps per year, we have decided to take ESG, ESG combined and E, S, G scores. As it was mentioned earlier, ESG rating is environmental, social and governance scores that represent how well is company operating regarding social responsibility and sustainability. The difference between general and combined ESG score is that combined score takes in consideration controversies (Thomson Reuters, 2019). ESG combined scored can be calculated by taking average between ESG score and ESG controversies score, but in certain scenario. As it can be seen on figure 3, if ESG score lower than controversies score, then ESG score is equal ESG combined score. If ESG score higher than controversies score and controversies have meaning lower than 50, then ESG combined score is average between general score and controversies score.

| Scenario | ESG Controversies Score | ESG Score | ESG Combined Score |
|---|---|---|---|
| If Controversies Score > =50, then ESG Score = ESG Combined Score | 57 | 38 | 38 |
| If Controversies Score > ESG Score but less than 50, then ESG Combined Score = ESG Score | 49 | 42 | 42 |
| If Controversies Score < 50 and Controversies Score < ESG Score, then ESG Combined Score = average of the ESG & Controversies Score | 48 | 49 | 48.5 |

*Figure 3. ESG combined score logic. Source: Thomson Reuters ,2019, p. 15*

As it can be seen in Figure 3, ESG score is divided on three subgroups which are divided in even smaller and variables such as human rights or emissions scores. Thus, ESG score can be cut on ten smaller groups. We believe, that this decision would provide us more accurate results as well as to see not only which of E, S or G has higher influence on number of jumps, but which part of them make that influence.

All the data regarding ESG scores were taken from Thomson Reuters Eikon platform. Access to the database was provided by Umeå University for thesis purposes. This database could be our only source to get ESG scores for Nordic companies. However, Thomson Reuters Eikon database is respected data source of world markets and were used by other researchers in their ESG scores studies such as Garcia et al. (2017).

Moreover, to see whether there are significant relationships between Environmental, Social or Governance score and the number of stock price jumps, we use weight system by Thomson Reuters (2019). Those weights are always having the same value. As it can be seen from Figure 4, any of ten categories which we are using in our study has weight when the ESG score is made. From the figure, it also can be seen that 34% of the ESG score is made by the Environmental categories. Within the Environmental score we can see on the figure that every category makes 11-12% of the rating. So, if only one category in the Environmental score will show a significant result, it would mean that 11% divided by 34% is 0.32 which is less than 0.5. Thus, to state that the Environmental score has a significant relationship with the number of stock price jumps, we need that at least two out of three categories show a significant relationship in our regression models. The same logic comes to the Social and the Governance score where the weight of the category which show significant result is divided by "Pillar" weight and if the result is 0.5 then we claim that ESG control variable also has a significant relationship with the number of stock price jumps.

| Pillar | Category | Indicators in Rating | Weights | Pillar Weights |
|--------|----------|---------------------|---------|----------------|
| Environmental | Resource Use | 19 | 11% | (11%+12%+11%) |
| | Emissions | 22 | 12% | |
| | Innovation | 20 | 11% | |
| Social | Workforce | 29 | 16% | (16%+4.5%+8%+7%) |
| | Human Rights | 8 | 4.50% | |
| | Community | 14 | 8% | |
| | Product Responsibility | 12 | 7% | |
| Governance | Management | 34 | 19% | (19%+7%+4.5%) |
| | Shareholders | 12 | 7% | |
| | CSR Strategy | 8 | 4.50% | |
| TOTAL | | 178 | 100% | |

*Figure 4. ESG category weights. Source: Thomson Reuters, 2019, p.8*

### 5.3.2 Beta

Beta is a measurement of systematic risk of individual stock in comparison with unsystematic risk of the whole market (Kenton, 2019). Beta has been added as a control variable for the number of price jumps as price jumps are connected with risks on the market and we assume beta can point at possible jumps. In order to calculate beta were used formula:

$$\text{Beta coefficient}(\beta) = \frac{\text{Covariance}(Re, Rm)}{\text{Variance}(Rm)}$$

Where:

*Re* – return on individual stock

*Rm* – return on overall market

### 5.3.3 Return on Assets

Return on Assets (ROA) represents how profitable is company relatively to its total assets (Hargrave, 2019). This variable is a signal for investors whether they should invest in a company or not. We believe, ROA can make an impact on the total number of stock price jumps as sudden poor performance can frighten off all investors and cause negative stock price jumps. For this thesis we have used Thomson Reuters Eikon database to get information regarding ROA for listed company from 2008 until 2017. Return on assets can calculated by following formula:

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

### 5.3.4 Debt to equity ratio

Debt to equity is used to calculate financial leverage of the company (Kenton & Hayes, 2019). In this thesis, we assume that ability of shareholders to cover outstanding debts can trigger positive or negative jump. For example, if debt to equity meaning is relatively low, then company would be more attractive for potential investors and with high demand, stock price of the company can rapidly increase causing positive price jump. Hence, we are using debt to equity ratio as a control variable. Dept to equity ratio can be calculated by following formula:

$$\text{Debt to equity} = \frac{\text{Total Liabilities}}{\text{Total Shareholders' Equity}}$$

### 5.3.5 Earning per share

Earnings per share (EPS) represents how much profit from organization is allocated among all shares of common stock (Chen, 2019). EPS is one of illustrations of company profitability. As with many other control variables, EPS is one of many things that investors pay attention on before making decision. Thus, we believe, relatively rapid changes in EPS meanings can cause stock price jump. The formula for EPS is:

$$\text{EPS} = \frac{\text{Net Income} - \text{preferred dividends}}{\text{End of period common shares outstanding}}$$

### 5.3.6 Volume

In this thesis by a volume we mean the number of shares traded during a specific year. In our study, we intuitively assume that an information about the number of traded shares

per a specific time might influence investor's decision to buy or sell company's shares. As soon as the nature of price jumps is still discussed among researchers, we assume that any reaction on information such as the number of traded shares or any other information regarding company performance can cause price jumps. Thus, we would check to which extend our assume was close to reality.

We have used the official Nasdaq OMX Nordic website to get the data about the historical volume for each company. To do so, we downloaded the report for every company with daily volume. Then, we manually transferred to the excel file and calculated the number of traded shares per year for every company.

### 5.3.7 Market Capitalization

Market capitalization is a common measure to estimate the size of a company. In this thesis, the market capitalization has been retrieved from Thomson Reuters Eikon database for every company in the list. Data covers market capitalization from 2008 until 2017. We believe, that there are reasons to assume that the size of a company may affect the number of stock price jumps. Doyle (2018) concludes that companies with higher market capitalization are more likely to receive higher ESG score. It can be assumed that with a higher ESG scores companies receive more attention, especially when the high ESG score has been received in unethical way which can cause scandals like the Volkswagen emission scandal. According to Seth (2019), the market capitalization is calculated by following formula:

$$\text{Market Capitalization} = \text{Current share price} \times \text{Total number of outstanding shares}$$

### 5.3.8 Total Debt

By total debt we understand a combination of short-term and long-term debts (Lacoma, 2017). The short-term liabilities must be paid within 12 months, while long-term debt generally includes liabilities that must be paid longer than 12 months.

### 5.4 Data Collection

The data for this study was retrieved from Thomson Reuters Eikon database. Thomson Reuters database covers more than 7000 public companies all over the world (Thomson Reuters, 2019) and can provide both company's ESG score and a financial data which is needed for our study.

Once sampling is done then we have started to withdraw the data which is needed to answer our research question. First of all, we have found the ESG and ESG combined scores for all listed companies. Then, we have found the E, S and G scores for every company in the list. Unfortunately, Eikon database do not provide direct score for the E, S and G, but it provides scores for every component. Thus, Environmental score is presented by "Resource use score", "Emission score", "Innovation score"; Social is presented by "workforce score", "Human rights score", "Community score", "Product responsibility score" and Governance is presented by "management score", "shareholders score" and "CSR strategy score". Also, we have downloaded the data that is needed for regression analysis or to find variable from regression analysis: "size" (represented by market capitalization), "Beta", "Return on assets", "Total assets", "Total debt", "Net income" and "Earnings per share". To be able to compare countries with different currencies, all the data was downloaded in the USD currency. In order to get the data

about the number of traded shares per year ("volume") we had to use Nasdaq official website and download the report for every company directly and calculate manually the annual volume. Moreover, the number of overall, positive and negative jumps had to be calculated manually by using daily stock prices from Eikon database from 01.01.2008 to 31.12.2017.

All the data collected from Thomson Reuters Eikon database was structured as a panel data to ease the process of data observation. Data was structured manually and pasted in Excel before it was imported in STATA. STATA is a software that helps researchers to analyse the data (University of South Australia, n.d.). Particularly in our study STATA is used in order to do linear regression models and descriptive statistics. There are other programs such as SPSS or SAS that also allow person to work with data to run regression model, but our choice of STATA is explained by one main reason. As we have some data missing for several years for several companies, STATA can still work with that without affecting the final score. Meanwhile SPSS require us to fill in empty cells with average score which would strongly change our final results.

## 5.5 Regression Model

The regression model used for this study is a panel regression model. The regression model will have three separate "measures" of the number of stock price jumps: overall number of stock price jumps, number of negative stock price jumps and number of positive stock price jumps. On the other hand, to be more concrete with our results we test dependent variables with ESG combined and ESG scores separately. Moreover, to answer on our second research question, we are going to put Environmental score (ES), Social score (SS) and Governmental score (GS) in regression model to see how every part of ESG interacts with the number of stock price jumps.

$NSPJ_{it} = a + B_1 ESG_{it} + B_2 Size_{it} + B_3 Beta_{it} + B_4 ROA_{it} + B_5 Total\ debt_{it} + B_6 Debt\ to\ equity\ ratio_{it} + B_7 Earnings\ per\ share_{it} + B_8 Volume_{it} + \mu_{it}$

Where,

NSPJ = Number of stock price jumps

a = constant

Bj = Coefficient (j=1, 2, 3…8)

$X_{it}$ = independent variable

μ = error term for dependent variable

# 6. EMPIRICAL RESULTS

*In this chapter we present our results from multiple regression model tests. First, we present descriptive statistics for the dependent and the independent variables that we have used in the regression models. After that we discuss descriptive statistics for ESG and stock price jumps separately. Then, we present results for overall Nordic region as well as over countries we used in our study. In the end, table 28 will show summary of accepted and rejected hypotheses.*

## 6.1 Descriptive Statistics

In Table 5 below, we present descriptive statistics for all dependent and independent variables that have been used in our study. As it can be seen from the table, the mean value of positive and negative jumps almost the same. Moreover, it can be seen that the ESG and ESG combined scores varies from 9.006 to around 90 points and standard deviation 14.576 for ESG score and 15.126 for ESG combined score. If we look deeper on ESG score, all 10 variables except CSR strategy has maximum score higher that 99 points. Also, the highest mean value among ESG variables belongs to Human Rights score reaching score 77.006. On the other hand, the lowest mean value among ESG variables belongs to Management Score reaching 49.946 points. When it comes to beta, it varies from 0.14 to 3.63 with standard deviation equal to 0.478. The lowest result for Return on assets is -0.455% when the highest one is 0.752%. Debt to equity in our study vary from 0 to 32.932 with average meaning 0.722 and standard deviation 1.566. Mean value for Earnings per Share is 2.553 USD where minimum is -62.483 USD and maximum 270.888 USD. Meanings for volume lies between 0 and 16597.82 million traded shares. In the end, size of the company which is represented by market capitalization has it lowest meaning equal to 7.87 million USD and 120854.4 million USD maximum value, with standard deviation 12860.62 and mean value 7858.68 million USD.

Table 5. Descriptive statistics of variables

| VARIABLE | MINIMUM | MEAN | MAXIMUM | STANDARD DEVIATION |
|---|---|---|---|---|
| *Number of jumps* | 3 | 13.101 | 22 | 2.944 |
| *Number of negative jumps* | 0 | 6.931 | 15 | 2.327 |
| *Number of positive jumps* | 1 | 6.17 | 14 | 2.254 |
| *ESG combined score* | 9.006 | 53.405 | 87.905 | 15.126 |
| *ESG score* | 9.006 | 59.87 | 89.582 | 14.576 |
| *Resource score* | 0.617 | 70.21 | 99.819 | 21.296 |
| *Emissions score* | 0.852 | 66.875 | 99.765 | 22.299 |
| *Innovation score* | 0.231 | 63.756 | 99.390 | 24.105 |
| *Workforce score* | 1.485 | 63.667 | 99.843 | 25.192 |
| *Human rights score* | 4.605 | 77.006 | 99.754 | 21.814 |
| *Community score* | 0.532 | 52.726 | 99.798 | 28.666 |

| | | | | |
|---:|:---:|:---:|:---:|:---:|
| *Product responsibility score* | 0.215 | 55.185 | 99.669 | 27.166 |
| *Management score* | 0.704 | 49.946 | 99.296 | 28.765 |
| *Shareholders score* | 0.704 | 51.143 | 99.254 | 28.482 |
| *CSR strategy score* | 1.042 | 51.245 | 98.507 | 27.589 |
| *Beta* | 0.14 | 1.028 | 3.63 | 0.478 |
| *Return on assets* | -0.455 | 0.066 | 0.752 | 0.076 |
| *Total debt (million)* | 0 | 1983.058 | 32291 | 3760.863 |
| *Debt on equity ratio* | 0 | 0.722 | 32.932 | 1.566 |
| *Earnings per share* | -62.483 | 2.553 | 270.888 | 15.842 |
| *Volume (million)* | 0 | 353.21 | 16597.82 | 950.958 |
| *Size (million)* | 7,87 | 7858.68 | 120854.4 | 12860.62 |

### 6.1.1 ESG Score

As we are trying to find a link between the frequency of stock price jumps and the ESG scores, it is worth to review the ESG score results deeper. As it was mentioned above, the ESG score can have value from 0 to 100, where 0 is the worst possible score and 100 is the best one. ESG combined score has same possible meanings. As it can be seen in Figure 2, the ESG score consist of ten measurements which are similar to the ESG score, have possible scores from worst 0 to the best 100. From Table 5, it can be seen that the highest ESG score registered for Nordic region is equal to 89.582 when the highest ESG combined score is 87.905. From variables that the ESG score consists of, the highest score belongs to Community score with meaning 99.798. When it comes to the lowest score, ESG and ESG combined the lowest score is 9.006. For variables, the lowest score is represented by Product Responsibility 0.215. By this, we can see that the ESG score variables selection of values is far higher than ESG and ESG combined scores.

According to Table 6, Swedish companies has mean value higher for every variable except Management and Shareholders scores in comparison with Nordic region overall. Even though, Management score for Swedish companies is 49.488 versus 49.946 where we can tell that the difference is not so significant. Despite the fact that the ESG and ESG combined scores have the same minimum and maximum value, the difference between mean values is much higher than in Nordic Region. This fact can point at frequent controversies among ten ESG scores categories in Swedish companies.

Table 6. Descriptive statistics for Sweden

| VARIABLE | MINIMUM | MEAN | MAXIMUM | STANDARD DEVIATION |
|---|---|---|---|---|
| ESG combined score | 9.006 | 53.405 | 87.905 | 15.126 |
| ESG score | 9.006 | 59.87 | 89.582 | 14.576 |
| Resource score | 0.617 | 70.21 | 99.819 | 21.296 |
| Emissions score | 0.852 | 66.875 | 99.765 | 22.299 |
| Innovation score | 0.231 | 63.756 | 99.390 | 24.105 |
| Workforce score | 1.485 | 63.667 | 99.843 | 25.192 |
| Human rights score | 4.605 | 77.006 | 99.754 | 21.814 |
| Community score | 0.532 | 52.726 | 99.798 | 28.666 |
| Product responsibility score | 0.215 | 55.185 | 99.669 | 27.166 |
| Management score | 0.704 | 49.946 | 99.296 | 28.765 |
| Shareholders score | 0.704 | 51.143 | 99.254 | 28.482 |
| CSR strategy score | 1.042 | 51.245 | 98.507 | 27.589 |

Finland illustrates the highest minimum ESG and ESG combines scores among all Nordic countries that equal to 22.04 and 21.589 respectively. Overall, the Finnish companies scores are close to average in the region where some are slightly higher like the Resource score: 70.243 versus 70.21 in the Nordic region; some are slightly lower such as Shareholders score: 51.116 versus 51.143 in the Nordic Region. The lowest mean value among the ESG criteria is the Community score equal to 46.573 and the standard deviation 25.639. On the other hand, Human rights score is the highest score among the Finnish companies with value 73.836 and standard deviation 21.615.

Table 7. Descriptive statistics for Finland

| VARIABLE | MINIMUM | MEAN | MAXIMUM | STANDARD DEVIATION |
|---|---|---|---|---|
| ESG combined score | 21.589 | 54.763 | 87.905 | 14.341 |
| ESG score | 22.04 | 59.55 | 89.582 | 13.588 |
| Resource score | 0.938 | 70.243 | 99.819 | 21.384 |
| Emissions score | 5.303 | 70.758 | 99.765 | 20.529 |
| Innovation score | 18.182 | 65.559 | 98.81 | 23.594 |

| VARIABLE | | | | |
|---|---|---|---|---|
| Workforce score | 8.333 | 60.622 | 96.154 | 21.291 |
| Human rights score | 24.658 | 73.836 | 99.194 | 21.615 |
| Community score | 0.532 | 46.574 | 98.913 | 25.639 |
| Product responsibility score | 0.391 | 55.209 | 99.497 | 27.555 |
| Management score | 1.786 | 50.878 | 98.214 | 28.845 |
| Shareholders score | 1.786 | 51.116 | 98.214 | 27.367 |
| CSR strategy score | 1.786 | 50.297 | 98.214 | 28.809 |

If we take a look on descriptive statistics for Denmark which are presented in Table 8, we can notice that mean value for the Danish companies is lower than the average for the Nordic Region. However, despite having lower values the Danish companies are following the trend that is common for the Nordic Region. The difference between the ESG scores and the ESG combined scores for the Danish companies is similar with the Nordic region which means that the Danish organisations have average controversies regarding the ESG score in the Nordic Region.

Table 8. Descriptive statistics for Denmark

| VARIABLE | MINIMUM | MEAN | MAXIMUM | STANDARD DEVIATION |
|---|---|---|---|---|
| ESG combined score | 19.976 | 49.608 | 80.275 | 13.367 |
| ESG score | 19.976 | 54.923 | 80.275 | 12.969 |
| Resource score | 13.636 | 68.868 | 97.619 | 20.653 |
| Emissions score | 0.893 | 56.805 | 96.304 | 23.473 |
| Innovation score | 0.231 | 51.698 | 98.344 | 22.948 |
| Workforce score | 2.344 | 62.645 | 98.478 | 27.079 |
| Human rights score | 22.727 | 74.992 | 99.383 | 23.291 |
| Community score | 0.775 | 36.828 | 90.789 | 26.315 |
| Product responsibility score | 2.679 | 48.659 | 99.669 | 26.197 |
| Management score | 1.613 | 48.489 | 98 | 28.498 |
| Shareholders score | 2 | 50.007 | 98.387 | 26.989 |
| CSR strategy score | 2.174 | 52.893 | 98.387 | 26.187 |

Descriptive statistics for Norway can be seen in Table 9. The mean value for the ESG and ESG combined score is 52.228 and 60.422 respectively which are lower than the average in the Nordic Region. In comparison with the other countries in the Nordic region, Norway has the highest average Shareholders score equal to 53.818 and Management score 51.730. Also, Norwegian company's community score has the highest standard deviation value among all the other ESG variables and countries in the region which equal to 31. The lowest minimum score among all variables belongs to Emission score 0.852 and highest minimum score belongs to the Human Rights score 27.845. When it comes to maximum score, the highest performance is shown by Workforce score 99.843 when the lowest maximum score belongs to the Emissions score 96.254.

Table 9. Descriptive statistics for Norway

| VARIABLE | MINIMUM | MEAN | MAXIMUM | STANDARD DEVIATION |
|---|---|---|---|---|
| ESG combined score | 18.332 | 52.228 | 87.617 | 16.166 |
| ESG score | 18.332 | 60.422 | 87.899 | 16.786 |
| Resource score | 0.617 | 61.664 | 97.358 | 20.278 |
| Emissions score | 0.852 | 61.868 | 96.254 | 21.769 |
| Innovation score | 23.188 | 65.919 | 99.39 | 23.546 |
| Workforce score | 2.201 | 65.377 | 99.843 | 27.834 |
| Human rights score | 27.846 | 78.867 | 99.275 | 21.764 |
| Community score | 1.258 | 61.069 | 99.798 | 31.01 |
| Product responsibility score | 4.545 | 60.875 | 99.479 | 24.31 |
| Management score | 2.632 | 51.73 | 97.619 | 29.826 |
| Shareholders score | 2.381 | 53.818 | 97.368 | 29.245 |
| CSR strategy score | 2.381 | 49.153 | 97.619 | 29.619 |

**6.1.2 Descriptive Statistics for Dependent Variables**

Table 10 below represents the summary statistics on the dependent variables of this study included in the regression analysis. The total number of jumps which are further divided into positive and negative number of jumps are included in this table for all 10 years of time series. As it can be seen, total 1050 observations included in the sample. The maximum jumps for a single stock in a year was 22 and the minimum number of jumps for a company in a year was 3. The average number of total jumps over the years for companies listed on the Nordic Stock Exchanges was 13,1 with the standard deviation of 2.944. Different numbers have been found when the total number of jumps were being further divided into two parts, positive and negative jumps. Surprisingly, the mean value,

standard deviation, maximum and minimum numbers of jumps are quite close for both positive and negative jumps over the period among all the samples. As it is seen in the table, the maximum number of positive jumps for a single stock over a single year is 14 whereas it is 15 for negative jumps. There was at least 1 positive jump took place for a single stock in a year against 0 negative jump to be as minimum. The average value of positive number of jumps for all listed Nordic companies is slightly lower than the average value of negative jumps over a year and same result is reflected for the standard deviation as well.

Table 10. Overall descriptive statistics of stock price jumps

| VARIABLE | OBS | MEAN | STD. DEV. | MIN | MAX |
|---|---|---|---|---|---|
| *Total number of jumps* | 1050 | 13.1 | 2.944 | 3 | 22 |
| *Number of positive jumps* | 1050 | 6.17 | 2.254 | 1 | 14 |
| *Number of negative jumps* | 1050 | 6.931 | 2.327 | 0 | 15 |

In this study, the identification of jumps is related to standard deviation. As discussed earlier instead of taking a constant standard deviation value over the full period, we calculated it for each year to get more specific result in identifying jumps. The year 2008 was the first year of the time series selected for this study which is also belongs to the period of massive world-wide financial crisis. Thus, while calculating the standard deviation we saw the effect of that unstable situation on the stock market. Following chart shows the position of the calculated standard deviations over the period.
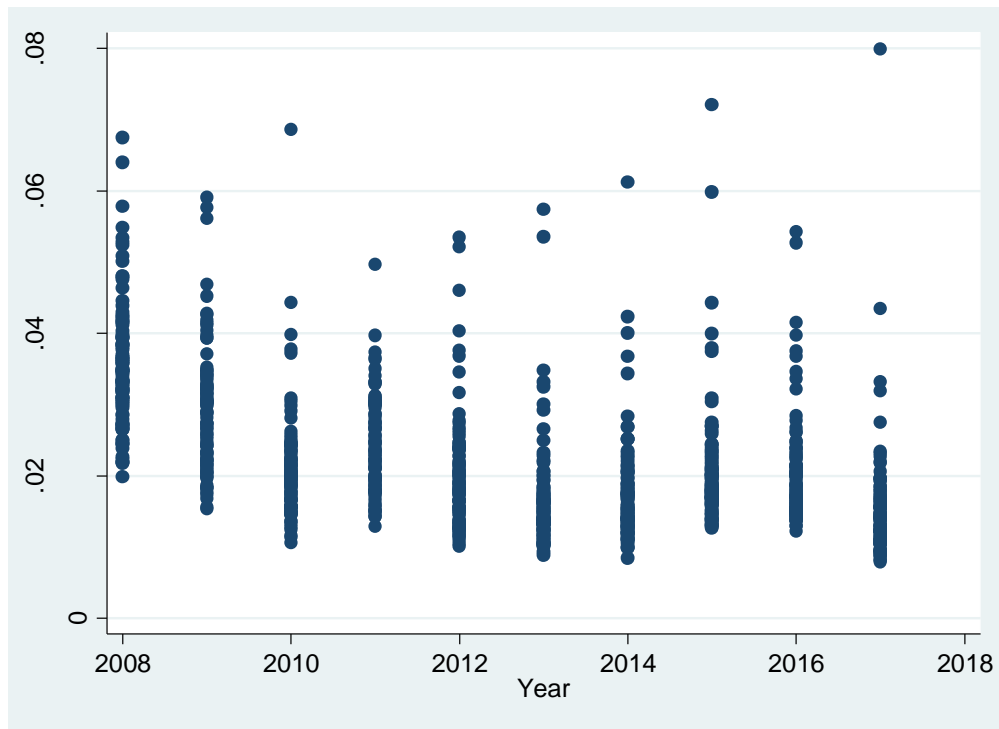


*Figure 5. Standard deviation over the years from 2008 to 2017*

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According to our calculation, to be a jump the stock price change needs to be larger than 2 standard deviation which means that if for a period the standard deviation is high then it needs to be a larger change in the stock price to be a jump.

From the figure above, we see in 2008 the standard deviation was relatively higher on average which could be a result of financial crisis during that year and then there is a negative overall trend is taking place by the following years which is a sign of more stable market. In addition to that, it also states that in 2008 when the standard deviation is relatively higher, that is why to be a jump it needs to be a larger return change. In the later years the lower standard deviation is found which means for example, 2% change in return might not be a jump in 2008 but in 2014 a 2% change is enough to be a jump. This is how the jumps concept works related to the changing trend of the standard deviation.

As stated earlier, total 105 company's data have been included in this study which belong to four Nordic countries. As it can be seen from Table 11, a major portion of them are from the Sweden which is 48 in number and the second most belong to Finland with 25 companies. Other than those, 19 and 13 companies are from Denmark and Norway respectively. The average number of jumps are quite close among the countries despite of having very different number of companies. Among the four Nordic countries the highest average number of positive jumps belong to Norway, which is 6,654, on the contrary Denmark has the highest number of negative jumps which is 7.311. The maximum number of positive jumps for a single stock over a single year is 14 which is from Norway and maximum 15 negative jumps were experienced by two companies of Denmark and Norway. Furthermore, the companies of Sweden had experienced at least 1 positive and 1 negative jump for a single year, which is minimum of 1 positive and 2 negative jumps for the companies of Finland, for Denmark the minimum number is 1 and 0 for positive and negative jumps respectively. In case of Norway the minimum number of positive jumps is 1 whereas the minimum number is 2 for negative jumps.

Table 11: Country wise descriptive statistics of stock price jumps

| COUNTRY | VARIABLE | OBS | MEAN | STD. DEV. | MIN | MAX |
|---------|----------|-----|------|-----------|-----|-----|
| *Sweden* | *Total Number of Jumps* | 480 | 13.14 | 2.94 | 5 | 20 |
| | *Number of Positive Jumps* | 480 | 6.098 | 2.268 | 1 | 12 |
| | *Number of Negative Jumps* | 480 | 7.042 | 2.339 | 1 | 14 |
| *Finland* | *Total Number of Jumps* | 250 | 12.644 | 2.812 | 6 | 20 |
| | *Number of Positive Jumps* | 250 | 6.184 | 2.117 | 1 | 12 |
| | *Number of Negative Jumps* | 250 | 6.460 | 2.09 | 2 | 14 |
| *Denmark* | *Total Number of Jumps* | 190 | 13.311 | 3.097 | 3 | 22 |
| | *Number of Positive Jumps* | 190 | 6 | 2.225 | 1 | 12 |
| | *Number of Negative Jumps* | 190 | 7.311 | 2.635 | 0 | 15 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Norway* | *Total Number of Jumps* | 130 | 13.531 | 2.894 | 5 | 20 |
| | *Number of Positive Jumps* | 130 | 6.654 | 2.449 | 1 | 14 |
| | *Number of Negative Jumps* | 130 | 6.877 | 2.098 | 2 | 15 |

Table 12 shows the descriptive statistics of stock price jumps over the years. The time series selected for this study has started from 2008. From the following table it can be seen that the average of total number of jumps is the highest in 2008 which is 14.905. The unstable situation of finance and economy of that period could be a reason behind that. After 2008 the average value started to get lower, but it was not a constant down trend. Though, the last year of the selected time series 2017 showed the lowest mean value for stock price jumps for among all ten years which is 11.762. The highest average of positive jumps was 8.124 in the year of 2008 and the lowest average positive jumps was 5.343 in 2013. The average value of negative jumps reached the highest level in year 2009 which is 8.448 and on the contrary the lowest average was 6.171 in year 2017. By looking at the average value of the total number of jumps and number of negative jumps it can been seen that the year 2017 was in more stable situation compare to the year 2008 and 2009.

Table 12. Year wise descriptive statistics of stock price jumps

| YEAR | VARIABLE | OBS | MEAN | STD. DEV. | MIN | MAX |
|---|---|---|---|---|---|---|
| *2008* | *Total Number of Jumps* | 105 | 14.905 | 2.38 | 8 | 20 |
| | *Number of Positive Jumps* | 105 | 8.124 | 2.041 | 4 | 14 |
| | *Number of Negative Jumps* | 105 | 6.781 | 1.871 | 2 | 11 |
| *2009* | *Total Number of Jumps* | 105 | 14.057 | 2.835 | 5 | 21 |
| | *Number of Positive Jumps* | 105 | 5.61 | 1.8 | 1 | 11 |
| | *Number of Negative Jumps* | 105 | 8.448 | 2.519 | 3 | 15 |
| *2010* | *Total Number of Jumps* | 105 | 12.676 | 2.705 | 7 | 18 |
| | *Number of Positive Jumps* | 105 | 5.629 | 2.113 | 1 | 12 |
| | *Number of Negative Jumps* | 105 | 7.048 | 2.077 | 2 | 12 |
| *2011* | *Total Number of Jumps* | 105 | 14.476 | 2.749 | 6 | 19 |
| | *Number of Positive Jumps* | 105 | 7.724 | 2.318 | 2 | 12 |
| | *Number of Negative Jumps* | 105 | 6.752 | 2.009 | 3 | 11 |
| *2012* | *Total Number of Jumps* | 105 | 12.781 | 2.869 | 5 | 20 |
| | *Number of Positive Jumps* | 105 | 6.086 | 2.171 | 1 | 11 |
| | *Number of Negative Jumps* | 105 | 6.695 | 2.374 | 2 | 13 |
| *2013* | *Total Number of Jumps* | 105 | 12.59 | 3.14 | 3 | 18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | *Number of Positive Jumps* | 105 | 5.343 | 2.061 | 1 | 10 |
| | *Number of Negative Jumps* | 105 | 7.248 | 2.967 | 0 | 15 |
| *2014* | *Total Number of Jumps* | 105 | 12.505 | 3.058 | 5 | 22 |
| | *Number of Positive Jumps* | 105 | 5.381 | 2.016 | 1 | 11 |
| | *Number of Negative Jumps* | 105 | 7.124 | 2.356 | 1 | 13 |
| *2015* | *Total Number of Jumps* | 105 | 12.095 | 2.384 | 7 | 18 |
| | *Number of Positive Jumps* | 105 | 5.543 | 1.902 | 1 | 12 |
| | *Number of Negative Jumps* | 105 | 6.552 | 2.038 | 2 | 12 |
| *2016* | *Total Number of Jumps* | 105 | 13.162 | 2.682 | 6 | 19 |
| | *Number of Positive Jumps* | 105 | 6.667 | 2.133 | 2 | 12 |
| | *Number of Negative Jumps* | 105 | 6.495 | 1.902 | 2 | 12 |
| *2017* | *Total Number of Jumps* | 105 | 11.762 | 2.94 | 6 | 20 |
| | *Number of Positive Jumps* | 105 | 5.59 | 1.89 | 1 | 11 |
| | *Number of Negative Jumps* | 105 | 6.171 | 2.268 | 1 | 14 |

## 6.1.3 Correlation Matrix

In Appendix 2 we presented a correlation matrix for the independent variables. As the ESG score is used in ESG combined score calculations, it can be seen a high correlation between them equal to 0.644. Moreover, there is a relatively high correlation between total debt and size of the company 0.586 which is one of the highest correlations among independent variables. The highest correlation is between the Workforce score and the ESG score equal to 0.708, which can be explained with the fact that the Workforce score is one of ten variables of the ESG score. The least correlated variables are return on assets and the Shareholders score with a correlation value of -0.175. Overall, there are no case of high correlation except for among ESG combined, ESG and ESG variables scores, which can be explained by fact that they are used in order to calculate each other score and as soon as they are not going to be used in the same regression analysis, we can claim that variables used in this study are not overlapping in their model contribution.

## 6.2 Regression Results

## 6.2.1 ESG Score and Stock Price Jumps

In Table 13 results are presented from the multiple regression model where the dependent variable is the number of stock price jumps. The model is aiming to see if there a significant relationship between the ESG score and the total number of stock price jumps. As it can be seen from Table 13, Coefficient for the ESG score is 0.002 which means that with every unit change for the ESG score, total number of jumps would change with the

0.165%. Therefore, we can reject the existence of any relationship between the ESG score and stock price jumps in the Nordic region countries.

Additionally, Table 13 shows that total debt and earnings per share have a significant positive relationship with the number of stock price jumps, both at the 5% significance level, while Size has significant negative relationship with stock price jumps on 1% significance level. This kind of relationship can be stated by looking on coefficient as well. From the table we can see that the coefficient for the size is negative, so whenever company increases market capitalization, its probability of the stock price jumps decreases. On the other hand, total debt and earnings per share have positive coefficient, which means that whenever their value increases, the number of stock price jumps also increases.

Table 13. Regression model: ESG score and total number of stock price jumps

| Total number of stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| ESG score | 0.002 | 0.008 | 0.21 | 0.832 | -0.014 | 0.02 |
| Size | -3.94e-11*** | 1.12e-11 | -3.51 | 0.000 | -6.15e-11 | -1.73e-11 |
| Beta | 0.026 | 0.209 | 0.12 | 0.902 | -0.385 | 0.437 |
| Returns on assets | 1.903 | 1.676 | 1.14 | 0.256 | -1.387 | 5.193 |
| Total debt | 7.19e-11** | 3.44e-11 | 2.09 | 0.037 | 4.41e-12 | 1.39e-10 |
| Debt to equity ratio | -0.003 | 0.06 | -0.06 | 0.955 | -0.12 | 0.114 |
| Earnings per share | 0.013** | 0.006 | 2.12 | 0.034 | 0.001 | 0.024 |
| Volume | -4.08e-11 | 1.03e-10 | -0.39 | 0.693 | -2.44e-10 | 1.62e-10 |
| Constant | 12.943*** | 0.505 | 25.64 | 0.000 | 11.95 | 13.934 |
| | | | | | | |
| $R^2$ | 0.0227 | | | | | |
| $R^2$ adjusted | 0.0133 | | | | | |
| № of obs. | 846 | | | | | |
| Root MSE | 2.899 | | | | | |

Note: *= p<0.10; **= p<0.05; ***=p<0.01

In Appendix 3 (Table A), we present regression results divided by countries. Overall, in the Nordic region, there is no significant relationship between the ESG score and the number of stock price jumps. However, in Norway, the ESG score has a significant relationship with stock price jumps at the 10% significance level. If the ESG score increase by one-unit, total number of stock price jumps would increase by 3.4%. Other Nordic countries do not show significant relationship between the ESG score and total number of stock price jumps.

When it comes to Sweden, the ESG score's t-value is 0.74 and coefficient 0.01. As for the Nordic region, the highest significance shows company's market capitalization. The t-value for Size is -2.48 and significance level is 5%. With higher market capitalization in Sweden, companies are more likely to experience fewer number of stock price jumps. Also, beta shows a significant relationship with stock price jumps in Sweden at

significance level 10%. However, higher beta value might mean higher number of stock price jumps on Swedish market.

None of independent variables has a significant relationship with the stock price jumps in Finland. Nevertheless, the Finnish market is one where higher ESG score might decrease overall number of jumps. The ESG score in Finland has t-value equal to -1.14 which is the closest to significant value in comparison with other variables, but still not enough to be stated significant.

In Denmark, three variables show a significant relationship with the total number of stock price jumps: size, beta and earning per share at 5% significance level for all three variables. Increasing size and beta would decrease the number of stock price jumps, while the volume would increase the number of jumps.

Table 14. ESG score regression model results in the Nordic region

| Variable | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Total number of jumps ESG score | 0.002 | 0.008 | 0.21 | 0.832 | -0.014 | 0.02 |
| Number of positive jumps ESG score | 0.007 | 0.006 | 1.32 | 0.187 | -0.004 | 0.019 |
| Number of negative jumps ESG score | -0.006 | 0.006 | -0.95 | 0.342 | -0.018 | 0.006 |

In Table 14 we present results for the ESG score in regression model whereas dependent variables were the total number of jumps, the number of positive and negative stock price jumps in the Nordic region. When it comes to the positive stock price jumps, the regression model shows that the relationship between the ESG score and number of positive stock price jumps is more significant than relationship between the ESG score and overall number of jumps, but with t-value 1.32, so we can state that the relationship is insignificant. The coefficient for the ESG score is 0.007 and the standard deviation is 0.006.

Regarding other independent variables, it can be seen from Appendix 3 (Table B) that the Size has a negative relationship with the number of positive stock price jumps on significance level 1%. With the increase in value in Size, the number of positive stock price jumps would decrease. From the other side, return on assets and total debt show positive relationship with number of positive jumps on the stock price market on 5% and 1% significance level respectively.

In Appendix 3 (Table B) results are presented for regression models to test the relationship between the ESG score and the number of positive stock price jumps in the Nordic countries. It can be seen that the relationship between the ESG score and positive stock price jumps is not significant in Sweden, Finland and Denmark, but is significant in Norway at the 1% significance level. The t-value for ESG score in Norway is 3.06 with a coefficient 0.046. It means that for companies operating in Norway, an increase in the

ESG score value by one unit, the number of positive stock price jumps would increase by 4.63%.

When it comes to other independent variables, size has a significant relationship with the number of positive jumps in Sweden, Finland and Denmark on the significance level 5%, 10% and 1%, respectively. In addition to that, in Sweden significant results are shown by beta with t-value 1.75 and Volume with a t-value of 2.14. In Finland, except size, higher total debt can increase the number of positive stock price jumps. For Denmark, at a significance level 1%, return on assets causes a higher number of positive jumps on stock market.

Regarding the negative number of jumps, ESG score has an insignificant relationship with negative stock price jumps. The t-value for the ESG score in regression model is -0.95. The coefficient for the ESG score in the regression model is -0.006 with 95% confidence interval between -0.018 and 0.006. Among all independent variables, only earnings per share shows the significant relationship with the number of negative stock price jumps on the significance level 5%. With every unit of earnings per share increase, the number of negative stock price jumps would show 0.9% fall.

As it is illustrated in Appendix 3 (Table C), among the four countries in the Nordic region, only in Finland a significant relationship can be seen between the ESG score and the number of negative stock price jumps at a significance level of 5% with a t-value -2.12 and a coefficient of -0.024. In Sweden and Denmark, there are no significant relationships between any of independent variables and negative stock price jumps. Meanwhile, in Norway earnings per share and return on assets have significant relationship with the number of negative stock price jumps at the 5% significance level both, with a t-value -2.1 and 2 respectively.

### 6.2.2 ESG Combined Score and Stock Price Jumps

In Table 15 we present results for the ESG combined score. As it can be seen, in the Nordic region, ESG combined score has an insignificant relationship with the any kind stock price jumps. However, for the Nordic region, the regression model shows that at 5% significance level, when total debt or earnings per share increase by one unit, the total number of stock price jumps increase. Also, at a significance level 1%, the Size of a company can also increase the total number of stock jumps.

Table 15. ESG combined score regression models results in the Nordic region

| Variable | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **Total number of jumps** ESG combined score | 0.002 | 0.007 | 0.28 | 0.779 | -0.011 | 0.015 |
| **Number of positive jumps** ESG combined score | 0.001 | 0.005 | 0.22 | 0.829 | -0.008 | 0.011 |
| **Number of negative jumps** ESG combined score | 0.001 | 0.005 | 0.16 | 0.875 | -0.009 | 0.011 |

As can be seen in Appendix 3 (Table D), in Finland the ESG combined score shows a significant relationship with the overall number of stock price jumps at 1% significance level with a -1.91 t-value score and coefficient equal to -0.025. We can also be 95% confident that true coefficient value for ESG combined score in Finland lies between -0.0499 and 0,036. The highest impact on number of stock jumps in Sweden is done by a company market capitalization and beta, which is the same for Denmark. However, in addition to the Size and the Beta, in Denmark, a significant relationship is shown by the earnings per share. When it comes to Norway, none of independent variables has illustrated any significant result.

The ESG combined score does not have a significant relationship with the positive stock price jumps in the Nordic region countries. A t-value for the ESG combined score in the Nordic region is 0.22 and the coefficient is 0.001. For other independent variables, the result is similar to the ESG score. Significant results are shown by the size and total debt. In addition to them, a higher return on assets can cause the higher frequency of positive stock price jumps for a company in the Nordic region.

In Appendix 3 (Table E) the similar results can be seen as for the Nordic region. None of the studied countries has shown a significant relationship between the ESG combined scores and the positive stock price jumps. The country with the highest t-value is Norway. However, with a t-value 1.64, it is not enough to claim about a significant relationship. When it comes to other independent variables, the size of a company demonstrates the significant relationship with the positive stock price jumps in all studied countries except Norway, where none of the independent variables has shown any significant result.

The ESG combined score does not have any significant relationship with the negative stock price jumps. A t-value for ESG combined score is 0.16 and coefficient 0.001, where 95% confidence interval lies between -0.009 and 0.011. For the other control variables, the earnings per share demonstrates significant relationship with the number of negative stock price jumps. At 5% significance level, by one unit increase in earnings per share, the number of negative stock price jumps increases by 0,95%.

In spite the fact that the ESG combined score has no significant relationship with negative stock price jumps in the Nordic region, we can see that this relationship exists in Sweden and Finland. As can be seen from Appendix 3 (Table F), at 5% significance level, by every unit increase in the ESG score, the number of negative stock price jumps increases by 1.77% in Sweden. Meanwhile, the situation in Finland is opposite. At 5% significance level, by every unit increase in the ESG combined score, the number of negative stock price jumps in Finland decrease by 2.37%.

### 6.2.3 Environmental Score and Stock Price Jumps

Next three sections would be devoted to our second research question which is "*Does the E, S and G, components of the sustainability rating individually create different impacts on the frequency of stock price jumps?*". In this section we discuss our results regarding relationships between the Environmental score and stock price jumps. According to Table 15, there is no significant relationship between the Environment score and the total number of stock price jumps in the Nordic region. The highest t-value among Environmental score control variables belongs to the Innovation score, which is equal to -1.19 and a coefficient -0.006; the lowest t-value is -0.07 and a coefficient -0.0003 performed by the Emissions score. The same results as for the ESG score show other

variables from regression model. To be exact, at 1% significance level the size has significant relationship with the total number of jumps. Meanwhile, at 5% significance level, both total debt and earnings per share show significant relationship with the stock price jumps in the Nordic countries.

Table 16. Environmental score regression models results in the Nordic region

| Environmental score | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **Total number of stock price jumps** | | | | | | |
| Resource score | 0.006 | 0.006 | 0.92 | 0.357 | -0.006 | 0.018 |
| Emissions score | -0.0003 | 0.006 | -0.07 | 0.947 | -0.011 | 0.011 |
| Innovation score | -0.006 | 0.005 | -1.19 | 0.236 | -.0156 | 0.004 |
| **Number of positive stock price jumps** | | | | | | |
| Resource score | 0.004 | 0.004 | 0.93 | 0.352 | -0.005 | 0.013 |
| Emissions score | -0.002 | 0.004 | -0.42 | 0.673 | -0.01 | 0.006 |
| Innovation score | 0.003 | 0.004 | 0.75 | 0.454 | -0.004 | 0.01 |
| **Number of negative stock price jumps** | | | | | | |
| Resource score | 0.001 | 0.005 | 0.31 | 0.755 | -0.008 | 0.011 |
| Emissions score | 0.001 | 0.004 | 0.31 | 0.759 | -0.007 | 0.01 |
| Innovation score | -0.009** | 0.004 | -2.20 | 0.028 | -0.016 | -0.001 |

Note: *= p<0.10; **= p<0.05; ***=p<0,01

In Appendix 3 (Table G) results are presented by countries, where it can be seen that there is a significant relationship between Environmental score and total number of jumps in Sweden and Denmark, while the similar significant relationship does not exist in Finland and Norway. In case of Sweden, the Resource and Innovation scores show a significant relationship with the total number of stock price jumps, both at the 1% significance level. However, if the Resource score shows positive relationship, the Innovation score shows negative one. When it comes to Denmark, as in Sweden, the Resource and the Innovation scores give a significant result at the 5% and 10% level, respectively. Despite the fact that the Environmental score has no significant result in Finland and Norway, in both countries the Emissions score has significant relationship with the total number of jumps on 10% and 1% level, respectively.

As can be seen from Table 16, the Environmental score has no significant relationship with the number of positive stock price jumps in the Nordic region. All three Environmental score controls have not reached significant result. When it comes to the other control variables, size and total debt show significant relationships at the 1% level with t-values -4.35 and 3.02 respectively. Moreover, return on assets affect positive stock price jumps at the 5% significance level.

If we take a look on the relationship between the Environmental score and the number of positive stock price jumps over countries, in Appendix 3 (Table H) we can see that in Finland all three Environmental score control variables show significant relationship with the number of positive stock price jumps at the 10% significance level. Resource's score t-value in Finland is 1.84 and a coefficient of 0.019; Emissions score t-value is -1.76 and a coefficient of -0.017; Innovation's score t-value is 1.80 and a coefficient of 0.013. When it comes to other countries, Resource score in Sweden has demonstrated t-value equal to 2.65 and a coefficient of 0.017 at the 1% significance level. None of the Environmental score control variables have reached significant results in Denmark, while in Norway Emissions score has significant relationship with positive jumps at the 1% level.

Also, in Table 16 we present results for regression model that we used to test a relationship between the Environmental score and the number of negative stock price jumps. As can be seen from the table, there is the Environmental score has no significant relationship with the number of negative stock price jumps in the Nordic region. Worth to be mentioned, the Innovation score has a negative relationship with the number of negative stock price jumps at the 5% significance level.

Regarding the Environmental score and the number of negative stock price jumps, only in Sweden, the Environmental score has a significant relationship between the Environmental score and the number of negative stock price jumps. For Sweden, two out of three Environmental score control variables have shown significant results: Resource score with t-value 1.86 and a coefficient of 0.013 at the 10% significance level, and Innovation score with t-value -2.67 and a coefficient of -0.018 at the 1% significance level. For all the rest Nordic region countries, there is no significant relationship between the Environmental score and the number of negative stock price jumps as it can be seen in Appendix 3 (Table I).

### 6.2.4 Social Score and Stock Price Jumps

In Table 17 results are presented for regression models that tested relationship between the Social score and any kind of stock price jumps. As it can be seen from the table, both Workforce and Product responsibility have significant relationship with the total number of stock price jumps in the Nordic region. The Workforce has positive relationship with the total number of stock price jumps with a coefficient of 0.01, while Product responsibility has negative relationship with a coefficient of -0.0009. It means that by one unit increase in Workforce score value, the number of stock price jumps increases by 1%. Meanwhile, by one unit increase in Product responsibility, the number of stock price jumps decreases by 0.9%. Nevertheless, according to Figure 4, the weight of the Workforce score is much higher than the Product responsibility. Thus, we can state that Social score has a significant positive relationship with the total number of stock price jumps.

Table 17. Social score regression models results in the Nordic region

| Social score | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | Total number of stock price jumps | | | | |
| Workforce score | 0.01** | 0.005 | 2.12 | 0.034 | 0.001 | 0.02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Human rights score* | 0.0004 | 0.005 | 0.06 | 0.948 | -0.01 | 0.011 |
| *Community score* | 0.0001 | 0.004 | 0.02 | 0.982 | -0.008 | 0.008 |
| *Product responsibility score* | -0.009** | 0.004 | -2.06 | 0.040 | -.0168 | -0.0004 |
| **Number of positive stock price jumps** | | | | | | |
| *Workforce score* | 0.009** | 0.004 | 2.47 | 0.014 | 0.002 | 0.016 |
| *Human rights score* | 0.003 | 0.004 | 0.78 | 0.437 | -0.005 | 0.011 |
| *Community score* | -0.002 | 0.003 | 0.78 | 0.451 | -0.008 | 0.004 |
| *Product responsibility score* | -0.005 | 0.003 | -0.75 | 0.124 | -0.011 | 0.001 |
| **Number of negative stock price jumps** | | | | | | |
| *Workforce score* | 0.002 | 0.004 | 0.42 | 0.674 | -0.006 | 0.009 |
| *Human rights score* | -0.003 | 0.004 | -0.64 | 0.526 | -0.011 | 0.006 |
| *Community score* | 0.002 | 0.003 | 0.72 | 0.470 | -0.004 | 0.009 |
| *Product responsibility score* | -0.004 | 0.003 | -1.19 | 0.234 | -0.01 | 0.003 |

Note: *= $p<0.10$; **= $p<0.05$; ***=$p<0,01$

Despite the fact that the Social score affects the total number of stock price jumps in the Nordic region, if we take a look in Appendix 3 (Table J), we would see that in Sweden Social score has a significant relationship with the total number of stock price jumps. Significant results in Sweden is shown by the Workforce score and Community score at the 10% significance level. The t-value for the Workforce score in Sweden is 1.86 and a coefficient of 0.015, while for the Community score the t-value equal to 1.84 and a coefficient of 0.013.

Also, in Table 17 can be seen results for the regression model between the number of positive stock price jumps and the Social score. From the table we can see that only the Workforce show a significant relationship with the positive number of jumps, which is not enough to state about significant relation between the Social score and the number of positive stock price jumps. The t-value for the Workforce score is 2.47 and a coefficient of 0.009 at the 5% significance level. The 95% confidence interval lies between 0.002 and 0.016. It should be mentioned that size, return on assets, total debt and volume show significant relationship with positive stock price jumps in the Nordic region.

As for the Nordic region, there is no significant result over countries as it can be seen in Appendix 3 (Table K). Except for Finland, in every country one of the Social score

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control variables have been found that show a significant result. In Sweden, it is Product responsibility with the t-value -2.26 and a coefficient of -0.011. In Denmark, it is Community score with the t-value -2.18 and coefficient -0.018. In Norway, it is Workforce score with the t-value 2.16 and a coefficient of 0.024.

Regarding the number of negative stock price jumps, there is no relationship between the Social score and the number of negative stock price jumps in the Nordic region. There is no Social score control variable that would show significant relationship with negative stock price jumps. From other independent variables, a significant relationship with the number of negative stock price jumps is shown by earnings per share at the 5% significance level, the t-value 1.99 and a coefficient of 0.009.

As with positive jumps, results over countries is totally the same as results in the Nordic region. In Appendix 3 (Table L) can be seen results over countries. The only Social score control variable that show significant result is Community score in Sweden at the 10% significance level with a coefficient of 0.011. For the other variables, the earnings per share in Finland show significant relationship with negative stock price jumps with a coefficient -0.306 and the t-value -2.10. In addition to it, the return on assets show significant relationship in Norway at the 5% significance level.

### 6.2.5 Governance Score and Stock Price Jumps

In Table 18 we can see the Governance score regression models results in the Nordic region. First of all, there is a significant positive relationship between the Governance score and the total number of stock price jumps in the Nordic region. The Management and Shareholders scores have significant relationship at the 10% level, while CSR strategy at the 1% level. Both Shareholders and CSR strategy scores by increasing one unit, would increase number of jumps by 0.66% and 1.15%, respectively, while Management score would decrease number of jumps by 0.62% under same conditions.

Table 18. Governance score regression models results in the Nordic region

| Governance score | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **Total number of stock price jumps** | | | | | | |
| Management score | -0.006* | 0.004 | -1.72 | 0.085 | -0.013 | 0.001 |
| Shareholders score | 0.007* | 0.004 | 1.80 | 0.073 | -0.001 | 0.014 |
| CSR strategy score | 0.012*** | 0.004 | 2.84 | 0.005 | 0.004 | 0.02 |
| **Number of positive stock price jumps** | | | | | | |
| Management score | -0.002 | 0.003 | -0.68 | 0.494 | -0.007 | 0.003 |
| Shareholders score | 0.003 | 0.003 | 1.12 | 0.263 | -0.002 | 0.008 |
| CSR strategy score | 0.006** | 0.003 | 2.02 | 0.043 | 0.0002 | 0.0118 |
| **Number of negative stock price jumps** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Management score* | -0.004 | 0.003 | -1.55 | 0.122 | -0.01 | 0.001 |
| *Shareholders score* | 0.004 | 0.003 | 1.24 | 0.215 | -0.002 | 0.009 |
| *CSR strategy score* | 0.006* | 0.003 | 1.73 | 0.084 | -0.001 | 0.012 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

Despite significant relationship between the Governance score and the total number of stock price jumps in the Nordic region, the same result cannot be seen for the all Nordic region countries that we used in this study. As can be seen in Appendix 3 (Table M) the CSR strategy show significant relationship with the number of jumps in Sweden and Norway at the 10% and 1% significance level, respectively. In addition to it, the Shareholders score has a significant result in Norway with the t-value of 1.84 and a coefficient of 0.021, while 95% confidence interval lies between -0.002 and 0.044.

Table 18, also, show results for the Governance score which claims that there is no significant relationship between the Governance score and the number of positive stock price jumps. To be exact, the Management and Shareholders scores do not have significant relationship with the number of positive stock price jumps. Hence, despite the fact that the CSR strategy has positive relationship with the number of positive stock price jumps, it is not enough to claim that Governance score can impact the positive jumps on the stock price market in the Nordic region. Nevertheless, with a p value of 0.043, by unit increase in CSR strategy, number of positive jumps would increase by 0.6%. Mentioning other control variables, the size and total debt have significant relationship with the number of positive stock price jumps at the 1% significance level.

If we take a look at Appendix 3 (Table N), we can see that there is a significant relationship between the Governance score and the number of positive stock price jumps in Finland and Norway. In Finland, the Management and CSR strategy scores have significant relationship with the number of positive jumps at the 10% and 5% significance level, respectively. However, if CSR strategy would increase the number of positive jumps in Finland by 1.33% per unit increase in the CSR strategy score, the total number of positive stock price jumps would decrease by 0.96% per unit increase in the Management score. In Norway, both Management and Shareholders scores have positive relationship with the number positive jumps and would increase them by 1.80% and 2.04% per unit, respectively.

Table 18 presents results for the negative stock price jumps. It can be seen from the table, that there is no significant relationship between the Governance score and the number of negative stock price jumps in the Nordic region. From the table can be seen that only CSR strategy score has a significant relationship with the number of negative stock price jumps in the Nordic region and by every unit increase in the CSR score, the number of negative jumps would increase by 0.36%. Among other control variables, the earnings per share and volume show a significant result at the 5% significance level.

In Appendix 3 (Table O) can be see results from regression model made over countries to see if there are significant relationships between Governance scores in the Nordic countries and the total number of negative stock price jumps. According to the table in

Appendix 3 (Table O), we can state that there is no significant relationship between the Governance score and the number of negative stock price jumps in the Nordic countries, except for Norway. In Norway, the Management and the CSR strategy scores show a sufficient result at the 1% and 5% significance level, respectively. However, it should be mentioned that the Management score has a negative relation with the number of negative jumps on a stock price market. Thus, by one unit increase in the Management score in Norway, the number of negative stock price jumps would decrease by 2.96%. On the other side, CSR strategy would increase number of negative jumps on the Norwegian stock price market by 2.46% per unit.

## 6.2.6 Hypothesis Testing Results

In the Table 19 can be seen summary of regression models results for the Nordic region as well as over the Nordic region countries. After all tests have done, we can see that for the Nordic region, in general, all hypotheses are being rejected. In the next chapter we would discuss deeper our hypotheses based on our research questions.

Table 19. Regression model results

| | Nordic region | Sweden | Finland | Denmark | Norway |
|---|---|---|---|---|---|
| *There is a significant relationship between ESG score ratings and total number of stock price jumps* | Reject | Reject | Reject | Reject | Accept |
| *There is a significant relationship between ESG score ratings and total number of positive stock price jumps* | Reject | Reject | Reject | Reject | Accept |
| *There is a significant relationship between ESG score ratings and total number of negative stock price jumps* | Reject | Reject | Accept | Reject | Reject |
| *There is a significant relationship between ESG combined score ratings and total number of stock price jumps* | Reject | Reject | Accept | Reject | Reject |
| *There is a significant relationship between ESG combined score ratings and total number of positive stock price jumps* | Reject | Reject | Reject | Reject | Reject |
| *There is a significant relationship between ESG combined score ratings and total number of negative stock price jumps* | Reject | Accept | Accept | Reject | Reject |
| *There is a significant relationship between ES and total number of stock price jumps* | Reject | Accept | Reject | Accept | Reject |

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| | Nordic region | Sweden | Finland | Denmark | Norway |
|---|---|---|---|---|---|
| *There is a significant relationship between ES and total number of positive stock price jumps* | Reject | Reject | Accept | Reject | Reject |
| *There is a significant relationship between ES and total number of negative stock price jumps* | Reject | Accept | Reject | Reject | Reject |
| *There is a significant relationship between SS ratings and total number of stock price jumps* | Accept | Accept | Reject | Reject | Reject |
| *There is a significant relationship between SS ratings and total number of positive stock price jumps* | Reject | Reject | Reject | Reject | Reject |
| *There is a significant relationship between SS ratings and total number of negative stock price jumps* | Reject | Reject | Reject | Reject | Reject |
| *There is a significant relationship between GS ratings and total number of stock price jumps* | Accept | Reject | Reject | Reject | Reject |
| *There is a significant relationship between GS ratings and total number of positive stock price jumps* | Reject | Reject | Accept | Reject | Accept |
| *There is a significant relationship between GS ratings and total number of negative stock price jumps* | Reject | Reject | Reject | Reject | Accept |

# 7. ANALYSIS

*In this chapter we discuss our findings relatively to our research questions and elaborate the results from the aspect of primary independent variables. Then, we connect our results with the previous studies on the ESG score and theories which we used in this study. After that, we analyse the difference between studied countries. In the end, we try to explain the possible reasons of results that we have received.*

## 7.1 Empirical Results Discussion

### 7.1.1 Discussion on the ESG Score Results

The first research question of this study aims to examine relationship between ESG score and the total number of jumps and particularly if a higher ESG score lowers the frequency of stock price jumps. To find out the answer to this question we have run multiple regression models starting with the general one and then more specific ones. Three regression model tests have been done focusing on the dependent variable from three aspects. First one was aimed to find out the relationship between the total number of price jumps and the control variables, the second one focused on the total number of positive stock price jumps and the control variables and the last one focused on the total number of negative stock price jumps and the control variables.

As stated and showed in the previous chapter, ESG score failed to show any significant relationship with the total number of jumps for the companies listed in the Nordic Stock exchanges. When it comes to the relationship between ESG score and positive stock price jumps, the test showed slightly higher significant results than the overall jumps. But still the change does not exceed the bar of being called "significant" which resulted into rejecting our hypothesis. Similar insignificant result has been found while testing the relationship between the ESG score and the number of negative jumps. Therefore, to answer our first research question it can be said that regardless of looking from any other aspect, the ESG score does not have any sort of significant relationships with jumps, neither with positive jumps nor the negative jumps.

Country-wise tests results tells a slightly different story. Among the four Nordic countries Norway shows a significant relationship between ESG score and the number of stock price jumps with 3.4% increase in price jumps if ESG score increases by 1 unit. Finland shows a noticeable result where higher ESG score decreases overall number of jumps but not in a significant level to be mentioned. The stock price jumps for the other two countries remain neutral towards the change in ESG scores. Almost similar results were found for the test used for positive number of jumps. All three countries except for Norway show neutral reaction against ESG score. For Norway, 1 unit increase in ESG score results into 4.63% increase in positive price jumps which shows a positive relationship between ESG score and price jumps. The negative price jumps on the contrary has been seen to have noticeable relation with ESG score only in Finland. According to the regression result, with the increase in ESG score the negative jumps tends to decrease for the companies listed in Finnish Stock Exchange. Which gives a partial significant answer for our first research question.

Compared to the ESG scores, the other control variables have shown more constant significant result with stock price jumps. Among them, total debt and earning per share showed to have positive relationships with the number of price jumps whereas company

size showed the opposite by having a negative relationship with the price jumps. Which means, the bigger the firm is the lower the chance of experiencing price jumps. On the other hand, the size of the company showed a negative relationship with positive number of jumps which cannot be said as a positive factor for big firms. In addition to that, returns on assets and total debt show positive relationship with number of positive jumps. The story is slightly different in case of negative number of jumps. As stated earlier, only the earning per share showed that 1 unit increase in EPS results into 0.9% fall in stock price jumps. Results for the other control variables can be generalized for all of the four Nordic countries with slight changes among the countries. But overall the situation is more or less same for all of them. This results also proves the reason behind choosing the Nordic countries for this study as the fundamental criteria of stock market are quite similar to each other, hence can be generalized the result for all of them.

### 7.1.2 Discussion on ESG Combined Score Results

In order to answer our first research question, we have not only used ESG score as control variable for stock price jumps, but also decided to use ESG combined score. The reason was to see does ESG combined score make higher impact on stock price jumps as soon as it is calculated by using ESG score and ESG controversy score as it can be seen in Figure 1. Thus, we did multiple regression models testing for our dependent variables with ESG combined score as control variable.

Overall, results for ESG combined score are similar to the result for the ESG score. As it can be seen from Table 29, ESG and ESG combined scores reject all hypotheses connected with them. It means that in Nordic region, ESG combined score do not have significant relationship with stock price jumps. Worth to be mentioned, that during our model tests, ESG's combined score t-value varied from 0,16 to 0,28 which can support the idea that ESG combined score is very far from significant results.

If we take a look over countries, we would see that in Sweden, ESG combined score has significant relationship with negative stock price jumps. However, it has no relationship with total number of jumps and positive stock price jumps. Meanwhile in Finland, it can be seen that ESG combined score has an impact on stock price jumps, especially on the negative ones. For Norway and Denmark results are similar as to Nordic region in general. No significant relationship between ESG combined score and stock price jumps were found in those two countries.

If we take a look on the other control variables in the regression models, we would see that variables such as Size, Total debt and Earnings per share show significant relationship with stock price jumps. market capitalization (Size) has negative impact on positive jumps, meaning that the bigger market capitalization, the lower chances to have positive stock price jumps. On the other hand, total debt shows positive relationship with stock price jumps, especially positive one. The most surprising result is shown by earnings per share. The higher the earning per share are, the higher the chance for negative stock price jumps. Those results might vary from country to country, but this trend can be seen in all Nordic countries.

### 7.1.3 Discussion on Environmental, Social and Governance Scores Results

Our second research question aimed to figure out if E, S, and G components individually create impact on stock price jumps. To answer this question, we have done multiple

regression model tests, but to have concrete results, we have done one regression model for each of the three factors for all three dependent variables (total number of stock price jumps, number of positive stock price jumps and number of negative stock price jumps).

As it was written in previous chapter, Environmental score has no significant relationship with neither the total number of stock price jumps, nor with positive and negative stock price jumps. Social score has demonstrated positive significant relationship with total number of stock price jumps in Nordic region. However, there is no relationship between negative or positive stock price jumps and Social score. This result for Social score might confuse as we cannot distinguish which kind of jumps Social score can cause. The Governance score have shown negative relationship with the total number of stock price jumps. But similar to Social score, Governance score has no significant relationship with positive or negative jumps. Thus, we can say that Social and Governance impact stock price jumps in Nordic region, but this study cannot specify which exact jumps they increase or reduce.

The different picture can be seen if take results over countries. All four countries which we used in our study illustrate different outcomes from regression model testing. For example, Environmental score shows significant relationship with the total number of stock price jumps and total number of negative stock price jumps in Sweden. Unfortunately, it might difficult to claim whether relationships are positive or negative when it comes to Environmental score. The reason is because all three control variables in Environmental score has the same weights and for Sweden in both cases two out of three variables have shown significant results with similar coefficient, but one is negative, and one is positive. When it comes to Social score, Swedish companies have the same result as Nordic region in general. The higher social score company had in Sweden, the more likely it would experience stock price jumps in period from 2008 to 2017. Governance score has no significant relationship with any stock price jumps in Sweden. Therefore, we can state that for Sweden, E and S factors determine stock price jumps.

We can state that according to regression model testing based on the Finnish companies, there is a significant positive relationship between the Environmental score and the number of positive stock price jumps in Finland. However, there is no relationship between the Environmental score and total number of stock price jumps as well as with the number of negative stock price jumps. The Social score do not make any impact on the Finnish stock price market as it has shown no significant results in all three regression model tests. The Governance score is also different for Finland from Nordic region results. Unlike Nordic region, there is no significant relationship between Governance score and Total number of stock price jumps. Nevertheless, Governance score has demonstrated negative relationship with number of positive stock price jumps. However, higher CSR strategy score would increase number of positive stock price jumps in Finland.

Environmental score for Denmark has similar results like in Sweden with only difference that there are no significant results regarding negative stock price jumps. As in Sweden, Environmental score control variables have opposite coefficients which complicates to state how it impacts number of jumps. Hypotheses regarding relationships between Social score and any kind of stock price jumps are totally rejected in Danish stock price market. The same can be stated for Governance score among companies operating in Denmark, which have shown no significant relationship between Governance score and stock price

jumps. Thus, we can see that only Environmental score has impact on overall stock price jumps, while Social and Governance have no impact at all.

Regarding Environmental score, Norway can show the same result as Nordic region in period from 2008 till 2017. Studying this period for Norway, we have found no significant relationship between Environmental score and stock price jumps. Despite the fact that Emission score has a high significance and can cause stock price jumps, it is not enough to claim for positive results about Environmental score. Similar to Finland, regression model tests have not revealed any significant results regarding Social score and stock price jumps in Norway. Nevertheless, there is a significant relationship between Governance score and both positive and negative stock price jumps. By increasing Governance performance on Norwegian market, companies are more likely to experience positive stock price jumps and reduce probability of negative stock price jump.

For other control variables, market capitalization (Size) and Earning per share have shown significant results. Market capitalization in all regression model tests has negative relationship with total number of jumps and positive jumps especially. It means that the higher market capitalization company has on the market, the less likely it would experience positive stock price jumps. Another result that worth to be mentioned is that during our E, S and G regression model tests, earnings per share demonstrated positive relationship with negative stock price jumps. Despite the fact, we cannot explain this relationship scientifically, we found this might be quite important to point out.

## 7.2 Discussion Alongside the Previous Studies

To the best of our knowledge, we did not find exact similar research focusing on ESG score and stock price jumps to which we could make a direct comparison but still we managed to find some studies, among all of them, some literatures can be connected to our research findings.

The research done by Sahut & Pasquini-Descomps (2015) based on the ESG impact on firms' market performance, did not find any significant relationship with ESG score and firm's market performance. Their study was based on UK, US and Switzerland and did not use ESG rating provided by any database such as Thomson Reuters Eikon. Despite of using Thomson Reuters Eikon database for this paper, no noticeable result has found between firm's sustainability score and stock price jumps except for slightly significant relation only for Finland and Norway.

Celik et. al. (2017) investigated "linkage between company scores and stock returns". They did portfolio level and firm level analysis where he found out no significant relation between company scores and stock returns in portfolio level, but they did find influence of economic, environmental, and social scores on stock returns. For our study we also found some noticeable results when we investigated social, corporate and governance scores individually what we called separately E, S and G score. Particularly social and governance scores had some significant effects on total number of stock price jumps for Nordic companies.

From the risk perspective, Kumar et al. (2016) have proven that better ESG performance reduces the risk and the volatility in their study focusing on the relationships between ESG factors and investment risk-adjusted performance. On the other hand, Breedt et al. (2018) found a slightly positive correlation between firms' ESG performance and the volatility. Unlike them, we did not find any significant correlation that can directly

support the fact that, the higher ESG scores of Nordic companies can results into reducing the stock price jump risks. The study does not really show any result of lessening the price jumps with increasing of the overall ESG score. That it can be concluded that the ESG seem to have more effect on the other part of the normal volatility that causing the lessening of total risk with the increase of the ESG score.

## 7.3 Analysis of the Results Based on the Included Theories

As discussed in the theoretical framework chapter, according to the Efficient Market Hypothesis and Adaptive Market Hypothesis theory, it is only new information that affects if the market functions efficiently. The findings of this thesis seem to be influenced by the core intuition of these theories.

We found many insignificant results because the investors are continuously observing the firms' activities including the ones related to CSR. There are a lot of media coverage also takes place on those CSR activities as firms do not do these secretly, instead use these activities as a boost to their brand building procedure. Therefore, the information regarding the sustainability tasks are becoming public at the time the task has been done. Which is potentially why the effect of these sustainability tasks may already be incorporate in the stock prices. So once the ESG score comes out it does not carry any surprise news or new information to the market or to the investors. Thus, the announcement of the ESG scores fails to create any mentionable effect on the stock price as the price is already adjusted because of the efficiency of the market. Hence, do not cause any stock price jumps.

## 7.4 Discussion Surrounding the Research Results over Studied Countries

As stated earlier, this study did not find any significant relationship between the overall ESG scores of Nordic companies and the stock price jump. Some differences have been notices in country wise analysis. For example, only the ESG scores of the companies of Finland show that higher ESG score can lower the frequency of negative stock price jumps. Therefore, shows a negative correlation with the risk. Which also indicates that the Finish investors are comparatively more concern about the companies to get the higher ESG score and seem to think the firms with high ESG score to be more stable and reliable.

On the other hand, there is a positive relationship has been found between the ESG score and the total number of jumps and the total number of positive jumps for the companies of Norway. That also supports the logic that higher ESG score can create a positive stock price jumps which results into higher return for the investors. However, as soon as there is relation with either number of positive, or negative stock price jumps, it can also mean that investors in Norway might invest in company which would have frequent negative stock price jumps. Therefore, in countries where the ESG score has a significant positive relationship with total number of stock price jumps, but no relation with the number of positive or negative stock price jumps, invest in these countries using principle "invest in highest ESG score" might turn into the Russian roulette where you do not know when, where and whom that bullet will shoot.

**7.5 Discussion Surrounding the Counteracting Effect in Study Results**

As shown in the previous sections, to understand the impact of the ESG scores on stock price jumps we further tested the E, S and G factors individually and found interesting results from that.

Some counteracting results have been found such as, high scores in governance factors are triggering the rise in positive jumps but on the contrary, low environmental scores are triggering the negative jumps. As a result, the counteracting effect of these individual components are taking out each other, which makes the overall effect close to zero.

This counteracting effect also explains the reason of not finding any significant result for the overall ESG score or the combined ESG score, as it can be seen in the undermeasures the effects are going into different ways. So, when the underlying components of E, S and G are going in different direction like one increase and one decrease, so the net effect that we measure for the ESG score or the combined score ends up being zero.

# 8. CONCLUSIONS AND RECOMMENDATIONS

*The concluding chapter will discuss to what extent the purpose of the study has been met, and the research questions have been answered. It will also discuss the societal and ethical implications of this thesis. Then, theoretical and practical contributions have been discussed which has been followed by the limitations of the study and suggestions for future research.*

## 8.1 Conclusions

The primary purpose of this study was to find out whether the ESG score or the sustainability performance of the firms' affects the frequency of the stock price jumps in the Nordic countries stock market. As a secondary purpose, we wanted to see if the E, S and G components of sustainability rating individually creates any impact on stock price jumps. To fulfill our purposes, we have examined relationships by running fifteen separate panel regression models, where we could see not only results regarding impact on total number of jumps, but also the negative and positive one. In addition to it, regression model has been held over all countries which we use in our study to see how different the results are from Nordic zone in general.

Empirical results have revealed to us that there is no significant relationship between the ESG score and any kind of stock price jumps. The same results have been shown by the ESG combined and Environmental score. However, the Social and Governance score have significant relationship with total number of jumps. Nevertheless, relationships have been found to vary over the countries.

As we stated earlier, when we run the regression, we did not find any significant result overall and the reason behind that might be the market is efficient. It might be that, investors they observe firms, they hear about their engagement in society and environment and they have already incorporated that news about sustainable works in the stock price. So, when they see the scores, that does not create any variation in the price. As according to the EMH theory it is only the new information that might affect the price to lead to potential price jumps.

On the other hand, one of the reasons behind getting different results for different countries might be that the efficiency of the markets is not the same for all those four countries. Which is why in some countries such as Norway and Finland we got significant result for the ESG score while for other two countries, it does not make any difference. Moreover, the behavior of the investors might also create such difference. It is always important for the investors what they care for. Thus, if a market has a lot of investors who are sensitive about sustainability and the sustainability score, might react more aggressively than the other investors. Which is also in line with the Adaptive market Hypothesis theory. Therefore, the explanation behind the insignificant results and partly significant results both can be related to the traditional EMH theory and the modern Adaptive Market Hypothesis theory. So, we can conclude that, in an efficient market, the effect of the ESG score is less likely to create any impact on stock price movement i.e. create any stock price jump while under different circumstances and market efficiency level, the ESG score is able to trigger extreme stock price movement i.e. create any stock price jump.

In analysis part, we stated that from investors perspective, they should look for research for a specific country in Nordic region, rather than use general reports for Nordic or Scandinavian regions. Also, in analysis part we have discussed that company market capitalization negatively impacts number of positive jumps, while total debt might only increase number of them. In addition to it, we have received a surprising result stating that earning per share have positive significant relationship with number of negative stock price jumps but we did not find any logical reason behind that.

## 8.2 Societal and Ethical Implications of the Research

The ethical considerations which were used in this study, were discussed in the Scientific Method chapter. As we have used the secondary data for this study, we cannot be totally confident how the used data was collected and to which extend participants were informed about it. On the other hand, we have used Thomson Reuters Eikon database which is public. So, we believe that data was collected in the ethical and legal way. In this thesis we have been honest and truthful, trying to avoid misrepresenting and speculative results. This thesis was done with purpose to study a relevant issue and to bring new value as well as increase our knowledge regarding the problem.

This thesis states that there is no significant relationship between the ESG performance and the number of stock price jumps. It should be clear that the lack of that relationship only shows that the number of stock price jumps is not that risk which can be lowered with a lower volatility in the Nordic region. On the other hand, this thesis shows that the Environmental and Social score have a significant relationship with the number of stock price jumps. We believe that companies are not focusing on the higher ESG score as a main goal while planning company activity, but this thesis can support companies that operating or planning to do so in the Nordic region to see which specific factors of the ESG score can help to reduce the number of jumps on stock price market. From investor perspective, this thesis helps to see that the higher ESG score does not mean lower probability of the stock price jumps. Hence, we believe, companies should work with specific ESG categories in order to lower the risk on the stock price market rather than focus on overall ESG score. By understanding which specific part of ESG can lower risk today, might bring a new investor in the future as soon as risk is playing an essential role in portfolio making process.

Despite the fact that this thesis is focusing on the Nordic countries, we hope that our study can be useful for other regions too. One of the ideas which come out from our study is that the ESG might not lower the risk of a stock price jumps, but depends on region and culture, law and other aspects in that region, a company needs to understand which part of sustainable performance might bring success when it comes to lowering risk of stock price jumps.

## 8.3 Theoretical and Practical Contribution

This thesis introduced how sustainability performance of a company could affect the frequency of stock price jumps in Nordic region. From this point of view, the theoretical contribution of this study is an addition to the literature that studies the market risks, very specifically, sustainability/ESG/CSR relation to the stock price movements or stock price jumps risk. As stated in the previous chapters, there is a huge knowledge gap exists in the area of relating ESG score and stock price jumps, so this study will increase the depth of research in the area. Few previously existing researches those are close to this area, had

some limitations with data collection method, measurement technique and most importantly not focused on sustainability effect on extreme stock price movements or jump risk. This paper on the contrary, used a more appropriate form of sustainability data from reliable source and the data for all the control variables had been chosen carefully to get more representative results. Besides, stock price jumps and the risk associated with it has been clearly identified and defined in this paper. Furthermore, the nature of stock price jumps is a highly discussed topic among the researchers in business area. Some define them as a rapid increase or decrease in price, while some provide a deep and very complicated scientific explanations that one who is not a professional in finance would barely understand them. In our study, we tried to provide a simple way of defining jumps based on previous research intuition and explained the relation in the simplest possible way to make it easily understandable for the reader. Thus, this paper would be a worthy inclusion for the stock price jumps literature as well.

The list of practical contributions of this paper can be started with the research area itself. The Nordic region is specifically important for sustainability issue because of its country-wise high ratings. No previous study could tell the investors of this area about the importance of sustainability score relating to the stock price jumps before this study. Thus, this study has made a practical contribution first by choosing the Nordic region as its research area. Results of our study provided validated information to the investors whether it is worth taking in consideration the ESG performance during investment decision making process, particularly for the stock market.

From investors perspective to be specific, it can be said that, the result of this study shows no significant effect of ESG score over stock price jumps, therefore, focusing on ESG score while trying to invest money in overall Nordic region might not be of utmost importance. However, it should be taking into consideration that country wise the results might be different, for example, higher ESG score in Sweden might increase number of negative stock price jumps, while in Finland it does the opposite. In any other case, it is more reasonable to look at company's market capitalization, total debt and earning per share if investor wants to reduce possibility of stock price jump risk.

There is no exact general formula can be recommended for every country included in the sample. Which is why, investigating the country wise results is strongly advised before taking any investment decision. For example, Environmental and Social scores is what investors should pay attention in Sweden. On the other hand, Governance score should be noticed before making any investment decision in Finland and Norway. When it comes to Denmark, Environmental score is what might be used in decision making process.

## 8.4 Limitations and Suggestions for Future Studies

There are some suggestions for future research have been presented below which also can be seen as the limitations for this study. Despite of giving the best effort from the both authors these limitations does exist because it could not be resolved within the limited time frame given to complete this research. These limitations do no decrease the reliability of the thesis but can be helpful for the future studies.

- For this study, the Nordic region has been chosen because of their highest ESG performance by countries in the world. However, the results could be more interesting for other geographical regions across the world. For example, USA

market also could be a good pick for this kind of study as it may allow to have a lot bigger sample size than our study.

- Iceland has been excluded from the study as its ESG performance is relatively lower that other countries in Nordic region and ranked below the top ten, as well as there is not much data available regarding ESG performance of companies operating in Iceland. Still, it could have been evaluated separately.

- The method of identifying jumps was very simple and straightforward in this paper basing on the same previous intuition done by previous researches. The change of the way of calculation by including some more variables can provide different result and much more solid ground for jump identification.

- One other aspect could be added while calculating the standard deviation, which is the basic of identifying jumps. In this thesis, standard deviation was being allowed to change over the year. The effect of a constant standard deviation over the full period could give another result in identification of jumps, which was not being tested in this paper. Therefore, it is recommended for future studies to consider this aspect while calculating jumps.

- The regression models used in this thesis were aimed to find out the relationship between the number of jumps and the ESG score, in addition to that with the other control variables as well according to the research purpose. But no causality effect among the variables were tested. Testing causality can be helpful to find out more reliable outcome about the actual effect of ESG score on stock price movements and would be interesting for further research.

# 9. TRUTH CRITERIA

## 9.1 Validity

Validity is one of the most important truth criterions in a research. Validity concerns the extent to which the research conclusions derived from the results is in line with the concepts it initially aimed to measure (Collis & Hussey, 2013, p. 53).

Validity testing includes assessing the logical alignment of the research concept with the research results and that also might include asking the expert opinion regarding the subject. In addition to that, the model construction and the other possible variables with impacting ability are also being evaluated (Bryman & Bell, 2011, p. 160). In this thesis, the dependent variable, stock price jump had been described by ESG score, which was the main independent variable. Other than these two, there were some other control variables such as trade volume, the number of market capitalization. All these variables were being included to support the result of the study by providing good measurement in accordance with the intention of the study. The model has been constructed based on several previous researches and thus can be trusted to have the validity.

Validity also considers the causality effect. A causal relationship needs to be proven between variables to ensure the internal validity, as stated by Bryman & Bell (2011). For this study, the absolute measure had been the coefficient for the variables found from the statistical result and statistical significance were being measured to find out the extent of the relationship among the variables. Valid and significant results had been found and presented accordingly in the previous sections but that does not prove the causality effect as the main focus of this research was to prove a relation and regression analysis cannot provide causality effect. Which is why the lack of internal validity cannot be considered as a negative issue.

External validity which can be defined as to what extent the research results are able to be generalizable beyond the specific research area. This is one of the primary reasons of researchers to be interested in generating representative samples (Bryman & Bell, 2015, p. 50 - 51). Generalizability issue has been considered for this study as well and that is explained in the following part of this section.

## 9.2 Reliability

The truth criteria Reliability is concerned with the repeatability of the results generated by a research (Bryman & Bell, 2011, p. 41). A consistent result is meant to be considered as reliable. Reliability plays a very important role while conducting a quantitative research as the researcher himself or herself is concerned about the stability of the measurements while using the quantitative method.

Most of the data included in this study except for daily trade volume for each stock had been retrieved from Thomson Reuters Eikon database which is very well-known for its data reliability characteristic. The trade volume data had been retrieved from the historical database of Nasdaq OMX Nordic database which is also reliable for such kind of data. Both the databases are providing historical data and not subject to change in the future.

Such type of study is subject to the risk of human error while processing the data. To minimize this risk the data collection and testing had been done at the presence of both

the authors and had been rechecked several times. In addition to that, all the steps starting from data retrieving to doing statistical tests have been described in the previous chapters for the easiness of future researchers. As stated before, ESG rating were being taken from Thomson Reuters Eikon, which is an agency who compiles a cumulative yearly score to measure individual firms' ESG performance. Different methodologies are being in practice by different agencies to measure the sustainability performance of the firms which may result into different ESG scores for the same firm. Thus, the authors cannot ensure the possibility of getting same results for ESG score provided by different rating agency.

In support of the reliability issue for this thesis it can be said that, the data sources were reliable, all calculations and decisions taken throughout the whole process have been explained, the program STATA has been used to do all statistical tests and the data processing have been done in an objective manner. All these factors clearly prove the reliability of this paper. Nevertheless, the existence of zero error cannot be guaranteed but the efforts to reduce the error can be guaranteed.

## 9.3 Generalizability

As stated earlier, the external validity or generalizability can be defined as to what extent the research results are able to be generalizable beyond the specific research area (Bryman & Bell, 2015, p. 50 - 51). For this thesis generalizability is whether the findings of this study generated from the companies of Nordic countries can further be used to explain the companies of another region or not.

All the companies listed on the Nordic countries' stock exchanges with ESG ratings for at least three years except for financial institutions are included as the sample of this study. The research population was all the companies listed in the stock exchanges of Nordic countries. The research findings can be generalized upon the population. As described above, the result of this study does not show any significant relationship between ESG Scores and stock price except for some mild connection with Norway and Finland.

Similar results however cannot be generalized for the companies listed in other countries stock exchanges. There are very few studies have been found to work with ESG score and stock price jumps to make a comparison between the findings of this paper and the other papers. But still, it can be said that, in this edge of sustainability awareness the results from other countries might show more significant result compared to Nordic countries, therefore the results are not generalized for the different regions

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# APPENDICES

## Appendix 1. List of the Companies Used in Study

| Company name | Country of Headquarters |
|---|---|
| Schibsted ASA | Norway |
| Atlas Copco AB | Sweden |
| Holmen AB | Sweden |
| Electrolux AB | Sweden |
| Telefonaktiebolaget LM Ericsson | Sweden |
| H & M Hennes & Mauritz AB | Sweden |
| NCC AB | Sweden |
| Sandvik AB | Sweden |
| Skanska AB | Sweden |
| AB SKF | Sweden |
| Trelleborg AB | Sweden |
| Volvo AB | Sweden |
| Amer Sports Oyj | Finland |
| Stora Enso Oyj | Finland |
| Huhtamaki Oyj | Finland |
| Kesko Oyj | Finland |
| Outokumpu Oyj | Finland |
| Rockwool International A/S | Denmark |
| Bang & Olufsen A/S | Denmark |
| Coloplast A/S | Denmark |
| AP Moeller - Maersk A/S | Denmark |
| GN Store Nord A/S | Denmark |
| NKT A/S | Denmark |
| Novo Nordisk A/S | Denmark |
| Flsmidth & Co A/S | Denmark |
| Topdanmark A/S | Denmark |
| DNO ASA | Norway |
| Norsk Hydro ASA | Norway |
| Orkla ASA | Norway |
| Tomra Systems ASA | Norway |
| Nokia Oyj | Finland |
| Yit Oyj | Finland |
| Demant A/S | Denmark |
| Tieto Oyj | Finland |
| Svenska Cellulosa SCA AB | Sweden |
| Hufvudstaden AB | Sweden |
| Uponor Oyj | Finland |
| Carlsberg A/S | Denmark |
| Santa Fe Group A/S | Denmark |
| Petroleum Geo Services ASA | Norway |
| Elekta AB (publ) | Sweden |
| Wartsila Oyj Abp | Finland |

| | |
|---|---|
| Metso Oyj | Finland |
| Tele2 AB | Sweden |
| SSAB AB | Sweden |
| DSV A/S | Denmark |
| Hexagon AB | Sweden |
| Nolato AB | Sweden |
| Securitas AB | Sweden |
| Beijer Ref AB (publ) | Sweden |
| Fabege AB | Sweden |
| Getinge AB | Sweden |
| Dampskibsselskabet Norden A/S | Denmark |
| H Lundbeck A/S | Denmark |
| Mowi ASA | Norway |
| Telia Company AB | Sweden |
| Gunnebo AB | Sweden |
| Nibe Industrier AB | Sweden |
| Fortum Oyj | Finland |
| Swedish Match AB | Sweden |
| Assa Abloy AB | Sweden |
| Nokian Tyres plc | Finland |
| Axfood AB | Sweden |
| Modern Times Group MTG AB | Sweden |
| Kemira Oyj | Finland |
| Castellum AB | Sweden |
| Sampo Oyj | Finland |
| Sanoma Oyj | Finland |
| UPM-Kymmene Oyj | Finland |
| Vestas Wind Systems A/S | Denmark |
| Konecranes Abp | Finland |
| Kungsleden AB | Sweden |
| TGS NOPEC Geophysical Company ASA | Norway |
| Svedbergs i Dalstorp AB | Sweden |
| Fastighets AB Balder | Sweden |
| Eniro AB | Sweden |
| SAS AB | Sweden |
| Fingerprint Cards AB | Sweden |
| Boliden AB | Sweden |
| Elisa Oyj | Finland |
| Genmab A/S | Denmark |
| Novozymes A/S | Denmark |
| Equinor ASA | Norway |
| Telenor ASA | Norway |
| Lundin Petroleum AB | Sweden |
| Alfa Laval AB | Sweden |
| Intrum AB | Sweden |
| Nobia AB | Sweden |
| Yara International ASA | Norway |

| | |
|---|---|
| Akastor ASA | Norway |
| Cargotec Oyj | Finland |
| Neste Oyj | Finland |
| Wihlborgs Fastigheter AB | Sweden |
| Kone Oyj | Finland |
| Tryg A/S | Denmark |
| ICA Gruppen AB | Sweden |
| Husqvarna AB | Sweden |
| REC Silicon ASA | Norway |
| Oriola Oyj | Finland |
| Outotec Oyj | Finland |
| Orion Oyj | Finland |
| Swedish Orphan Biovitrum AB (publ) | Sweden |
| Lindab International AB | Sweden |
| Nederman Holding AB | Sweden |
| Hexpol AB | Sweden |

# Appendix 2. Correlation Matrix

| | Size | ESG combined | ESG score | Recourse | Emissions | Innovations | Workforce | Human rights | Community | Product responsibility | Management | Shareholders | CSR strategy | Beta | Returns on assets | Total debt | Debt to equity ratio | Earnings per share | Volume |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size | 1.0000 | | | | | | | | | | | | | | | | | | |
| ESG combined | -0.0219 | 1.0000 | | | | | | | | | | | | | | | | | |
| ESG score | 0.3533 | 0.6443 | 1.0000 | | | | | | | | | | | | | | | | |
| Resource | 0.2437 | 0.4492 | 0.6754 | 1.0000 | | | | | | | | | | | | | | | |
| Emissions | 0.1802 | 0.4366 | 0.6278 | 0.5444 | 1.0000 | | | | | | | | | | | | | | |
| Innovations | 0.1325 | 0.3371 | 0.5185 | 0.3904 | 0.3988 | 1.0000 | | | | | | | | | | | | | |
| Workforce | 0.2809 | 0.4733 | 0.7088 | 0.5480 | 0.4418 | 0.2424 | 1.0000 | | | | | | | | | | | | |
| Human rights | 0.2315 | 0.2715 | 0.5040 | 0.4164 | 0.2553 | 0.2439 | 0.3852 | 1.0000 | | | | | | | | | | | |
| Community | 0.3007 | 0.2874 | 0.5816 | 0.3512 | 0.2544 | 0.2602 | 0.3229 | 0.4424 | 1.0000 | | | | | | | | | | |
| Product Responsibility | 0.1939 | 0.3408 | 0.5464 | 0.3711 | 0.3567 | 0.2313 | 0.4425 | 0.2804 | 0.2601 | 1.0000 | | | | | | | | | |
| Management | 0.2017 | 0.3407 | 0.5177 | 0.0502 | 0.0566 | 0.0244 | 0.0927 | 0.0761 | 0.2110 | 0.0685 | 1.0000 | | | | | | | | |
| Shareholders | -0.1718 | 0.1733 | 0.1436 | -0.0739 | -0.0183 | 0.0329 | -0.0292 | -0.0763 | -0.0161 | 0.0071 | 0.0792 | 1.0000 | | | | | | | |
| CSR Strategy | 0.3650 | 0.3029 | 0.6188 | 0.4689 | 0.3256 | 0.2639 | 0.4901 | 0.4408 | 0.3579 | 0.3200 | 0.2148 | -0.0451 | 1.0000 | | | | | | |
| Beta | 0.0502 | 0.0127 | 0.0693 | 0.1168 | 0.0409 | -0.0123 | -0.0351 | -0.0314 | 0.0254 | -0.0360 | 0.0933 | 0.1028 | 0.0777 | 1.0000 | | | | | |
| Returns on assets | 0.3205 | 0.0509 | 0.0716 | 0.1302 | 0.0706 | -0.1445 | 0.1816 | 0.1566 | 0.0508 | 0.0610 | 0.0112 | -0.1748 | 0.0737 | -0.1147 | 1.0000 | | | | |
| Total debt | 0.5863 | -0.0523 | 0.3006 | 0.1619 | 0.1352 | 0.2689 | 0.1998 | 0.1760 | 0.2635 | 0.1035 | 0.1357 | -0.0330 | 0.3038 | 0.0786 | -0.1303 | 1.0000 | | | |
| Debt to equity ratio | -0.0562 | 0.0186 | -0.0119 | 0.0281 | -0.0469 | -0.0263 | -0.0225 | -0.0054 | -0.0173 | -0.0518 | 0.0162 | 0.1114 | -0.0960 | -0.0398 | 0.0104 | 0.0486 | 1.0000 | | |
| Earnings per share | 0.1269 | -0.0373 | -0.0030 | 0.0134 | 0.0325 | 0.0776 | 0.0564 | 0.0596 | -0.0218 | -0.0718 | -0.0622 | -0.0469 | -0.0148 | 0.0293 | 0.0271 | 0.2199 | 0.0313 | 1.0000 | |
| Volume | 0.2854 | -0.0140 | 0.2697 | 0.1807 | 0.1706 | 0.1225 | 0.1294 | 0.1389 | 0.2211 | 0.2082 | 0.1143 | 0.0838 | 0.2252 | 0.0648 | -0.0317 | 0.2471 | -0.0038 | -0.0219 | 1.0000 |

**Appendix 3. Regression Model Results over the Nordic Region Countries.**

**Table A. Regression model: ESG score and Total number of stock price jumps by countries**

| Number of stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | *SWEDEN* | | | |
| ESG score | .0096877 | .0131596 | 0.74 | 0.462 | -.0161979 | .0355733 |
| Size | -6.61e-11 | 2.66e-11 | -2.48** | 0.014** | -1.18e-10 | -1.37e-11 |
| Beta | .8085854 | .4845108 | 1.67* | 0.096* | -.1444713 | 1.761642 |
| Returns on assets | .9942304 | 4.750285 | 0.21 | 0.834 | -8.349815 | 10.33828 |
| Total debt | 6.58e-11 | 6.70e-11 | 0.98 | 0.326 | -6.59e-11 | 1.98e-10 |
| Debt to equity ratio | .015078 | .0636244 | 0.24 | 0.813 | -.1100742 | .1402303 |
| Earnings per share | -.0032879 | .0096832 | -0.34 | 0.734 | -.0223353 | .0157595 |
| Volume | 1.14e-10 | 1.61e-10 | 0.71 | 0.480 | -2.03e-10 | 4.30e-10 |
| Constant | 11.78154 | 1.034145 | 11.39*** | 0.000*** | 9.747325 | 13.81575 |
| | | | *FINLAND* | | | |
| ESG score | -.0177297 | .0154885 | -1.14 | 0.254 | -.0482472 | .0127878 |
| Size | -1.84e-11 | 3.76e-11 | -0.49 | 0.625 | -9.24e-11 | 5.56e-11 |
| Beta | .4776998 | .4716581 | 1.01 | 0.312 | -.4516231 | 1.407023 |
| Returns on assets | .0586908 | 4.203331 | 0.01 | 0.989 | -8.223266 | 8.340647 |
| Total debt | 1.16e-10 | 1.17e-10 | 0.99 | 0.321 | -1.14e-10 | 3.47e-10 |
| Debt to equity ratio | .2402227 | .7152826 | 0.34 | 0.737 | -1.169121 | 1.649567 |
| Earnings per share | -.1122381 | .1933318 | -0.58 | 0.562 | -.4931659 | .2686896 |
| Volume | -1.31e-10 | 1.92e-10 | -0.68 | 0.495 | -5.10e-10 | 2.48e-10 |
| Constant | 13.22637 | 1.160022 | 11.40*** | 0.000*** | 10.94074 | 15.512 |
| | | | *DENMARK* | | | |
| ESG score | -.0155833 | .0217775 | -0.72 | 0.475 | -.0586045 | .0274379 |
| Size | -5.04e-11 | 2.03e-11 | -2.49** | 0.014** | -9.04e-11 | -1.04e-11 |
| Beta | -1.808204 | .7007523 | -2.58** | 0.011** | -3.192532 | -.4238766 |
| Returns on assets | 4.330359 | 2.715796 | 1.59 | 0.113 | -1.034664 | 9.695381 |
| Total debt | 8.30e-11 | 8.69e-11 | 0.96 | 0.341 | -8.87e-11 | 2.55e-10 |
| Debt to equity ratio | .0191341 | .5030706 | 0.04 | 0.970 | -.9746758 | 1.012944 |
| Earnings per share | .0224617 | .0103338 | 2.17** | 0.031** | .0020474 | .0428761 |
| Volume | 2.55e-09 | 1.90e-09 | 1.34 | 0.182 | -1.21e-09 | 6.32e-09 |
| Constant | 15.58382 | 1.459736 | 10.68*** | 0.000*** | 12.70012 | 18.46751 |
| | | | *NORWAY* | | | |
| ESG score | .0340637 | .0185473 | 1.84* | 0.070* | -.0027837 | .0709111 |
| Size | -1.87e-11 | 3.70e-11 | -0.51 | 0.614 | -9.22e-11 | 5.48e-11 |

| | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Beta | -.0804815 | .3100409 | -0.26 | 0.796 | -.6964319 | .5354688 |
| Returns on assets | 4.228693 | 3.920859 | 1.08 | 0.284 | -3.560778 | 12.01816 |
| Total debt | -2.96e-11 | 9.45e-11 | -0.31 | 0.755 | -2.17e-10 | 1.58e-10 |
| Debt to equity ratio | -1.104713 | .990303 | -1.12 | 0.268 | -3.072123 | .862697 |
| Earnings per share | -.2054821 | .2604432 | -0.79 | 0.432 | -.722898 | .3119339 |
| Volume | 1.62e-09 | 2.65e-09 | 0.61 | 0.543 | -3.65e-09 | 6.88e-09 |
| Constant | 12.23111 | 1.284811 | 9.52*** | 0.000*** | 9.678609 | 14.78361 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table B. Regression model: ESG score and Total number of positive stock price jumps by countries**

| Number of positive stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | *SWEDEN* | | | |
| ESG score | .0047285 | .0091333 | 0.52 | 0.605 | -.0132372 | .0226942 |
| Size | -4.66e-11 | 1.85e-11 | -2.52** | 0.012** | -8.29e-11 | -1.03e-11 |
| Beta | .5889515 | .336271 | 1.75* | 0.081* | -.0725101 | 1.250413 |
| Returns on assets | 4.973017 | 3.296899 | 1.51 | 0.132 | -1.512145 | 11.45818 |
| Total debt | 7.06e-11 | 4.65e-11 | 1.52 | 0.130 | -2.09e-11 | 1.62e-10 |
| Debt to equity ratio | -.0069574 | .044158 | -0.16 | 0.875 | -.0938183 | .0799036 |
| Earnings per share | -.001573 | .0067206 | -0.23 | 0.815 | -.0147927 | .0116467 |
| Volume | 2.39e-10 | 1.12e-10 | 2.14** | 0.033** | 1.96e-11 | 4.59e-10 |
| Constant | 5.079035 | .7177405 | 7.08 | 0.000 | 3.667204 | 6.490866 |
| | | | *FINLAND* | | | |
| ESG score | .0064283 | .0117264 | 0.55 | 0.584 | -.0166766 | .0295331 |
| Size | -4.81e-11 | 2.84e-11 | -1.69* | 0.092* | -1.04e-10 | 7.90e-12 |
| Beta | -.0077475 | .357093 | -0.02 | 0.983 | -.7113391 | .6958442 |
| Returns on assets | 1.385872 | 3.182347 | 0.44 | 0.664 | -4.884408 | 7.656152 |
| Total debt | 1.50e-10 | 8.86e-11 | 1.69* | 0.093* | -2.51e-11 | 3.24e-10 |
| Debt to equity ratio | .5752515 | .5415414 | 1.06 | 0.289 | -.4917646 | 1.642268 |
| Earnings per share | .112863 | .1463717 | 0.77 | 0.441 | -.1755378 | .4012639 |
| Volume | 4.50e-11 | 1.46e-10 | 0.31 | 0.758 | -2.42e-10 | 3.32e-10 |
| Constant | 5.330435 | .878254 | 6.07*** | 0.000*** | 3.599983 | 7.060887 |
| | | | *DENMARK* | | | |
| ESG score | -.017379 | .0154197 | -1.13 | 0.261 | -.0478405 | .0130825 |
| Size | -4.48e-11 | 1.43e-11 | -3.12*** | 0.002*** | -7.31e-11 | -1.64e-11 |
| Beta | -.8506396 | .4961735 | -1.71* | 0.088* | -1.830824 | .1295452 |

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| | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Returns on assets | 5.216794 | 1.922942 | 2.71*** | 0.007*** | 1.418046 | 9.015543 |
| Total debt | 8.05e-11 | 6.15e-11 | 1.31 | 0.193 | -4.11e-11 | 2.02e-10 |
| Debt to equity ratio | .0168203 | .3562033 | 0.05 | 0.962 | -.686855 | .7204956 |
| Earnings per share | .0082516 | .007317 | 1.13 | 0.261 | -.0062029 | .0227062 |
| Volume | 8.85e-10 | 1.35e-09 | 0.66 | 0.513 | -1.78e-09 | 3.55e-09 |
| Constant | 7.615172 | 1.033578 | 7.37*** | 0.000*** | 5.573351 | 9.656994 |
| *NORWAY* | | | | | | |
| ESG score | .0463126 | .0151308 | 3.06*** | 0.003*** | .0162526 | .0763727 |
| Size | 2.18e-11 | 3.02e-11 | 0.72 | 0.472 | -3.82e-11 | 8.17e-11 |
| Beta | .0019348 | .2529309 | 0.01 | 0.994 | -.5005567 | .5044262 |
| Returns on assets | -2.093884 | 3.198631 | -0.65 | 0.514 | -8.448523 | 4.260756 |
| Total debt | -1.22e-10 | 7.71e-11 | -1.59 | 0.116 | -2.75e-10 | 3.09e-11 |
| Debt to equity ratio | -.1883791 | .8078879 | -0.23 | 0.816 | -1.793389 | 1.416631 |
| Earnings per share | .2349869 | .2124692 | 1.11 | 0.272 | -.1871203 | .6570942 |
| Volume | 1.17e-09 | 2.16e-09 | 0.54 | 0.591 | -3.13e-09 | 5.46e-09 |
| Constant | 3.656781 | 1.048147 | 3.49*** | 0.001*** | 1.574455 | 5.739108 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table C. Regression model: ESG score and Total number of negative stock price jumps by countries**

| Number of negative stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| ESG score | .0049592 | .0099967 | 0.50 | 0.620 | -.0147048 | .0246231 |
| Size | -1.95e-11 | 2.02e-11 | -0.96 | 0.336 | -5.92e-11 | 2.03e-11 |
| Beta | .2196339 | .3680581 | 0.60 | 0.551 | -.5043545 | .9436223 |
| Returns on assets | -3.978787 | 3.608549 | -1.10 | 0.271 | -11.07698 | 3.119407 |
| Total debt | -4.73e-12 | 5.09e-11 | -0.09 | 0.926 | -1.05e-10 | 9.54e-11 |
| Debt to equity ratio | .0220354 | .0483322 | 0.46 | 0.649 | -.0730364 | .1171072 |
| Earnings per share | -.0017149 | .0073559 | -0.23 | 0.816 | -.0161842 | .0127545 |
| Volume | -1.25e-10 | 1.22e-10 | -1.03 | 0.305 | -3.66e-10 | 1.15e-10 |
| Constant | 6.702505 | .7855873 | 8.53*** | 0.000*** | 5.157216 | 8.247794 |
| *FINLAND* | | | | | | |
| ESG score | -.024158 | .0114128 | -2.12** | 0.035** | -.0466451 | -.001671 |
| Size | 2.97e-11 | 2.77e-11 | 1.07 | 0.284 | -2.48e-11 | 8.43e-11 |
| Beta | .4854473 | .3475446 | 1.40 | 0.164 | -.1993309 | 1.170225 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Returns on assets | -1.327181 | 3.097254 | -0.43 | 0.669 | -7.429799 | 4.775436 |
| Total debt | -3.32e-11 | 8.63e-11 | -0.39 | 0.700 | -2.03e-10 | 1.37e-10 |
| Debt to equity ratio | -.3350289 | .527061 | -0.64 | 0.526 | -1.373514 | .7034561 |
| Earnings per share | -.2251012 | .1424579 | -1.58 | 0.115 | -.5057905 | .0555881 |
| Volume | -1.76e-10 | 1.42e-10 | -1.24 | 0.215 | -4.56e-10 | 1.03e-10 |
| Constant | 7.895936 | .8547702 | 9.24*** | 0.000*** | 6.211755 | 9.580117 |
| DENMARK | | | | | | |
| ESG score | .0017957 | .0192786 | 0.09 | 0.926 | -.0362889 | .0398804 |
| Size | -5.63e-12 | 1.79e-11 | -0.31 | 0.754 | -4.10e-11 | 2.98e-11 |
| Beta | -.9575649 | .620343 | -1.54 | 0.125 | -2.183045 | .2679154 |
| Returns on assets | -.8864357 | 2.404166 | -0.37 | 0.713 | -5.635837 | 3.862966 |
| Total debt | 2.56e-12 | 7.69e-11 | 0.03 | 0.974 | -1.49e-10 | 1.55e-10 |
| Debt to equity ratio | .0023138 | .4453447 | 0.01 | 0.996 | -.8774593 | .882087 |
| Earnings per share | .0142101 | .0091481 | 1.55 | 0.122 | -.0038618 | .032282 |
| Volume | 1.67e-09 | 1.69e-09 | 0.99 | 0.323 | -1.66e-09 | 5.00e-09 |
| Constant | 7.968644 | 1.292236 | 6.17*** | 0.000*** | 5.415847 | 10.52144 |
| NORWAY | | | | | | |
| ESG score | -.012249 | .0149489 | -0.82 | 0.415 | -.0419476 | .0174496 |
| Size | -4.05e-11 | 2.98e-1 | -1.36 | 0.178 | -9.97e-11 | 1.87e-11 |
| Beta | -.0824163 | .2498896 | -0.33 | 0.742 | -.5788655 | .4140329 |
| Returns on assets | 6.322576 | 3.160169 | 2.00** | 0.048** | .0443485 | 12.6008 |
| Total debt | 9.26e-11 | 7.62e-11 | 1.22 | 0.227 | -5.87e-11 | 2.44e-10 |
| Debt to equity ratio | -.9163337 | .7981734 | -1.15 | 0.254 | -2.502044 | .669377 |
| Earnings per share | -.440469 | .2099144 | -2.10** | 0.039** | -.8575006 | -.0234374 |
| Volume | 4.50e-10 | 2.13e-09 | 0.21 | 0.833 | -3.79e-09 | 4.69e-09 |
| Constant | 8.574328 | 1.035543 | 8.28*** | 0.000*** | 6.51704 | 10.63162 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table D. Regression model: ESG combined score and Total number of stock price jumps by countries**

| Number of stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| SWEDEN | | | | | | |
| ESG combined score | .0155252 | .0104753 | 1.48 | 0.139 | -.0050802 | .0361307 |
| Size | -6.33e-11 | 2.55e-11 | -2.48** | 0.014** | -1.14e-10 | -1.31e-11 |
| Beta | .8595981 | .4817151 | 1.78* | 0.075* | -.0879594 | 1.807156 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Returns on assets | .6356444 | 4.740249 | 0.13 | 0.893 | -8.688659 | 9.959948 |
| Total debt | 7.12e-11 | 6.69e-11 | 1.06 | 0.288 | -6.04e-11 | 2.03e-10 |
| Debt to equity ratio | .0129737 | .0634752 | 0.20 | 0.838 | -.1118852 | .1378325 |
| Earnings per share | -.0036112 | .009662 | -0.37 | 0.709 | -.0226168 | .0153945 |
| Volume | 1.34e-10 | 1.61e-10 | 0.84 | 0.404 | -1.82e-10 | 4.50e-10 |
| Constant | 11.45455 | .8669524 | 13.21*** | 0.000*** | 9.749207 | 13.15988 |

### *FINLAND*

| | | | | | | |
|---|---|---|---|---|---|---|
| ESG combined score | -.0245592 | .0128523 | -1.91* | 0.057* | -.0498824 | .0007641 |
| Size | -2.39e-11 | 3.73e-11 | -0.64 | 0.522 | -9.73e-11 | 4.96e-11 |
| Beta | .460024 | .4553851 | 1.01 | 0.313 | -.4372357 | 1.357284 |
| Returns on assets | -.0870604 | 4.182715 | -0.02 | 0.983 | -8.328396 | 8.154275 |
| Total debt | 1.21e-10 | 1.16e-10 | 1.04 | 0.299 | -1.08e-10 | 3.50e-10 |
| Debt to equity ratio | .2001661 | .7121333 | 0.28 | 0.779 | -1.202973 | 1.603305 |
| Earnings per share | -.0889841 | .1929242 | -0.46 | 0.645 | -.4691088 | .2911405 |
| Volume | -1.95e-10 | 1.90e-10 | -1.03 | 0.305 | -5.68e-10 | 1.79e-10 |
| Constant | 13.59388 | 1.094819 | 12.42*** | 0.000*** | 11.43672 | 15.75104 |

### *DENMARK*

| | | | | | | |
|---|---|---|---|---|---|---|
| ESG combined score | .0125912 | .0184736 | 0.68 | 0.497 | -.0239031 | .0490855 |
| Size | -4.80e-11 | 2.05e-11 | -2.34** | 0.021** | -8.85e-11 | -7.43e-12 |
| Beta | -1.69558 | .7000185 | -2.42** | 0.017** | -3.078458 | -.3127021 |
| Returns on assets | 3.682259 | 2.716762 | 1.36 | 0.177 | -1.684672 | 9.049191 |
| Total debt | 6.77e-11 | 8.38e-11 | 0.81 | 0.421 | -9.79e-11 | 2.33e-10 |
| Debt to equity ratio | .2224382 | .4838549 | 0.46 | 0.646 | -.7334113 | 1.178288 |
| Earnings per share | .0226457 | .0103239 | 2.19** | 0.030** | .0022509 | .0430404 |
| Volume | 1.98e-09 | 1.83e-09 | 1.08 | 0.280 | -1.63e-09 | 5.59e-09 |
| Constant | 14.00697 | 1.280318 | 10.94*** | 0.000*** | 11.47772 | 16.53622 |

### *NORWAY*

| | | | | | | |
|---|---|---|---|---|---|---|
| ESG combined score | .0070646 | .0172143 | 0.41 | 0.682 | -.0271347 | .0412638 |
| Size | -9.07e-12 | 3.74e-11 | -0.24 | 0.809 | -8.34e-11 | 6.52e-11 |
| Beta | -.0657867 | .3201787 | -0.21 | 0.838 | -.7018776 | .5703042 |
| Returns on assets | 5.045257 | 3.964475 | 1.27 | 0.206 | -2.830864 | 12.92138 |
| Total debt | -1.75e-11 | 9.67e-11 | -0.18 | 0.857 | -2.10e-10 | 1.75e-10 |
| Debt to equity ratio | -1.220971 | 1.018808 | -1.20 | 0.234 | -3.245012 | .8030695 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Earnings per share | -.2137119 | .2680134 | -0.80 | 0.427 | -.7461673 | .3187436 |
| Volume | 2.04e-09 | 2.71e-09 | 0.75 | 0.453 | -3.34e-09 | 7.42e-09 |
| Constant | 13.77862 | 1.181659 | 11.66*** | 0.000*** | 11.43104 | 16.12619 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table E. Regression model: ESG combined score and Total number of positive stock price jumps by countries**

| Number of positive stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| ESG combined score | -.0021621 | .0072901 | -0.30 | 0.767 | -.0165021 | .0121779 |
| Size | -4.35e-11 | 1.78e-11 | -2.45** | 0.015** | -7.85e-11 | -8.54e-12 |
| Beta | .541438 | .3352413 | 1.62 | 0.107 | -.1179982 | 1.200874 |
| Returns on assets | 4.963452 | 3.298894 | 1.50 | 0.133 | -1.525635 | 11.45254 |
| Total debt | 7.03e-11 | 4.65e-11 | 1.51 | 0.132 | -2.12e-11 | 1.62e-10 |
| Debt to equity ratio | -.0069521 | .0441745 | -0.16 | 0.875 | -.0938454 | .0799413 |
| Earnings per share | -.0015267 | .0067241 | -0.23 | 0.821 | -.0147534 | .0116999 |
| Volume | 2.39e-10 | 1.12e-10 | 2.14** | 0.033** | 1.95e-11 | 4.59e-10 |
| Constant | 5.520151 | .6033405 | 9.15*** | 0.000*** | 4.33335 | 6.706951 |
| *FINLAND* | | | | | | |
| ESG combined score | -.0008714 | .0097858 | -0.09 | 0.929 | -.0201527 | .0184099 |
| Size | -4.70e-11 | 2.84e-11 | -1.66* | 0.099* | -1.03e-10 | 8.91e-12 |
| Beta | .0529972 | .3467333 | 0.15 | 0.879 | -.6301824 | .7361769 |
| Returns on assets | 1.388212 | 3.184748 | 0.44 | 0.663 | -4.886797 | 7.663222 |
| Total debt | 1.56e-10 | 8.84e-11 | 1.76* | 0.079* | -1.84e-11 | 3.30e-10 |
| Debt to equity ratio | .5603882 | .5422231 | 1.03 | 0.302 | -.5079712 | 1.628748 |
| Earnings per share | .1167138 | .1468938 | 0.79 | 0.428 | -.1727157 | .4061433 |
| Volume | 5.66e-11 | 1.44e-10 | 0.39 | 0.695 | -2.28e-10 | 3.41e-10 |
| Constant | 5.67768 | .8336031 | 6.81*** | 0.000*** | 4.035206 | 7.320155 |
| *DENMARK* | | | | | | |
| ESG combined score | -.011004 | .0131022 | -0.84 | 0.402 | -.0368873 | .0148792 |
| Size | -4.65e-11 | 1.46e-11 | -3.20*** | 0.002*** | -7.53e-11 | -1.78e-11 |
| Beta | -.8292534 | .4964817 | -1.67 | 0.097 | -1.810047 | .1515402 |

| | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Returns on assets | 5.125206 | 1.926839 | 2.66*** | 0.009*** | 1.318759 | 8.931653 |
| Total debt | 6.08e-11 | 5.94e-11 | 1.02 | 0.308 | -5.66e-11 | 1.78e-10 |
| Debt to equity ratio | .0919288 | .3431696 | 0.27 | 0.789 | -.5859986 | .7698563 |
| Earnings per share | .0089682 | .0073221 | 1.22 | 0.223 | -.0054966 | .023433 |
| Volume | 5.62e-10 | 1.30e-09 | 0.43 | 0.665 | -2.00e-09 | 3.12e-09 |
| Constant | 7.235136 | .9080535 | 7.97*** | 0.000*** | 5.441288 | 9.028985 |
| *NORWAY* | | | | | | |
| ESG combined score | .0233743 | .01429 | 1.64 | 0.105 | -.0050152 | .0517638 |
| Size | 3.10e-11 | 3.11e-11 | 1.00 | 0.321 | -3.07e-11 | 9.27e-11 |
| Beta | -.0249562 | .265787 | -0.09 | 0.925 | -.5529885 | .5030761 |
| Returns on assets | -1.165634 | 3.290993 | -0.35 | 0.724 | -7.703766 | 5.372498 |
| Total debt | -9.67e-11 | 8.03e-11 | -1.20 | 0.232 | -2.56e-10 | 6.29e-11 |
| Debt to equity ratio | -.1996405 | .845734 | -0.24 | 0.814 | -1.879839 | 1.480558 |
| Earnings per share | .2576483 | .2224835 | 1.16 | 0.250 | -.1843541 | .6996507 |
| Volume | 1.41e-09 | 2.25e-09 | 0.63 | 0.532 | -3.05e-09 | 5.88e-09 |
| Constant | 5.037866 | .98092 | 5.14*** | 0.000*** | 3.089098 | 6.986635 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table F. Regression model: ESG combined score and Total number of negative stock price jumps by countries**

| Number of negative stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| ESG combined score | .0176873 | .0079215 | 2.23** | 0.026** | .0021054 | .0332692 |
| Size | -1.98e-11 | 1.93e-11 | -1.03 | 0.305 | -5.78e-11 | 1.82e-11 |
| Beta | .3181601 | .3642745 | 0.87 | 0.383 | -.3983859 | 1.034706 |
| Returns on assets | -4.327808 | 3.584591 | -1.21 | 0.228 | -11.37888 | 2.72326 |
| Total debt | 8.37e-13 | 5.06e-11 | 0.02 | 0.987 | -9.87e-11 | 1.00e-10 |
| Debt to equity ratio | .0199257 | .0480001 | 0.42 | 0.678 | -.0744929 | .1143444 |
| Earnings per share | -.0020845 | .0073065 | -0.29 | 0.776 | -.0164566 | .0122877 |
| Volume | -1.05e-10 | 1.21e-10 | -0.87 | 0.387 | -3.44e-10 | 1.34e-10 |
| Constant | 5.934395 | .6555922 | 9.05*** | 0.000*** | 4.644813 | 7.223977 |
| *FINLAND* | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| *ESG combined score* | -.0236878 | .0094826 | -2.50** | 0.013** | -.0423717 | -.005004 |
| *Size* | 2.31e-11 | 2.75e-11 | 0.84 | 0.401 | -3.11e-11 | 7.73e-11 |
| *Beta* | .4070268 | .3359892 | 1.21 | 0.227 | -.2549835 | 1.069037 |
| *Returns on assets* | -1.475273 | 3.086063 | -0.48 | 0.633 | -7.555841 | 4.605295 |
| *Total debt* | -3.50e-11 | 8.57e-11 | -0.41 | 0.684 | -2.04e-10 | 1.34e-10 |
| *Debt to equity ratio* | -.3602221 | .5254215 | -0.69 | 0.494 | -1.395477 | .6750325 |
| *Earnings per share* | -.2056979 | .1423421 | -1.45 | 0.150 | -.486159 | .0747632 |
| *Volume* | -2.51e-10 | 1.40e-10 | -1.80* | 0.074* | -5.27e-10 | 2.42e-11 |
| *Constant* | 7.9162 | .8077725 | 9.80*** | 0.000*** | 6.32462 | 9.50778 |

<div align="center">**DENMARK**</div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *ESG combined score* | .0235953 | .0162408 | 1.45 | 0.148 | -.0084882 | .0556788 |
| *Size* | -1.46e-12 | 1.80e-11 | -0.08 | 0.936 | -3.71e-11 | 3.42e-11 |
| *Beta* | -.8663268 | .6154125 | -1.41 | 0.161 | -2.082067 | .3494132 |
| *Returns on assets* | -1.442947 | 2.388408 | -0.60 | 0.547 | -6.161218 | 3.275324 |
| *Total debt* | 6.83e-12 | 7.37e-11 | 0.09 | 0.926 | -1.39e-10 | 1.52e-10 |
| *Debt to equity ratio* | .1305094 | .425375 | 0.31 | 0.759 | -.7098138 | .9708326 |
| *Earnings per share* | .0136775 | .0090761 | 1.51 | 0.134 | -.0042523 | .0316073 |
| *Volume* | 1.42e-09 | 1.61e-09 | 0.88 | 0.379 | -1.76e-09 | 4.60e-09 |
| *Constant* | 6.771834 | 1.125575 | 6.02*** | 0.000*** | 4.548274 | 8.995395 |

<div align="center">**NORWAY**</div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *ESG combined score* | -.0163097 | .0135767 | -1.20 | 0.233 | -.0432823 | .0106628 |
| *Size* | -4.01e-11 | 2.95e-11 | -1.36 | 0.178 | -9.87e-11 | 1.85e-11 |
| *Beta* | -.0408305 | .2525211 | -0.16 | 0.872 | -.5425078 | .4608467 |
| *Returns on assets* | 6.210891 | 3.126734 | 1.99* | 0.050* | -.0009107 | 12.42269 |
| *Total debt* | 7.92e-11 | 7.63e-11 | 1.04 | 0.302 | -7.24e-11 | 2.31e-10 |
| *Debt to equity ratio* | -1.021331 | .8035219 | -1.27 | 0.207 | -2.617667 | .5750059 |
| *Earnings per share* | -.4713602 | .211379 | -2.23** | 0.028** | -.8913014 | -.0514189 |
| *Volume* | 6.27e-10 | 2.13e-09 | 0.29 | 0.770 | -3.61e-09 | 4.87e-09 |
| *Constant* | 8.74075 | .9319604 | 9.38*** | 0.000*** | 6.889248 | 10.59225 |

<div align="right">Note: *= p<0.10, **= p<0.05, ***=p<0,01</div>

**Table G. Regression model: Environmental score and Total number of stock price jumps by countries**

| Number of stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| **SWEDEN** | | | | | | |
| Resource score | .0302703 | .0092186 | 3.28*** | 0.001*** | .0121365 | .0484041 |
| Emissions score | -.0038472 | .0087926 | -0.44 | 0.662 | -.0211431 | .0134486 |
| Innovation score | -.025227 | .0085619 | -2.95*** | 0.003*** | -.042069 | -.008385 |
| Size | -6.35e-11 | 2.56e-11 | -2.48** | 0.013** | -1.14e-10 | -1.32e-11 |
| Beta | .6155835 | .4701266 | 1.31 | 0.191 | -.3091989 | 1.540366 |
| Returns on assets | -1.67817 | 4.728198 | -0.35 | 0.723 | -10.97897 | 7.622631 |
| Total debt | 6.63e-11 | 6.59e-11 | 1.01 | 0.315 | -6.33e-11 | 1.96e-10 |
| Debt to equity ratio | -.011542 | .062906 | -0.18 | 0.855 | -.1352838 | .1121999 |
| Earnings per share | .0002661 | .0096701 | 0.03 | 0.978 | -.0187557 | .019288 |
| Volume | 1.35e-10 | 1.58e-10 | 0.85 | 0.394 | -1.76e-10 | 4.47e-10 |
| Constant | 12.49928 | .8803772 | 14.20*** | 0.000*** | 10.76749 | 14.23106 |
| **FINLAND** | | | | | | |
| Resource score | .013497 | .0136836 | 0.99 | 0.325 | -.0134655 | .0404595 |
| Emissions score | -.0225607 | .0131148 | -1.72* | 0.087* | -.0484023 | .003281 |
| Innovation score | .0012066 | .0093664 | 0.13 | 0.898 | -.0172491 | .0196623 |
| Size | -2.40e-11 | 3.90e-11 | -0.61 | 0.540 | -1.01e-10 | 5.30e-11 |
| Beta | .2567819 | .4875351 | 0.53 | 0.599 | -.7038685 | 1.217432 |
| Returns on assets | .0180903 | 4.385132 | 0.00 | 0.997 | -8.622476 | 8.658656 |
| Total debt | 1.45e-10 | 1.21e-10 | 1.20 | 0.231 | -9.33e-11 | 3.84e-10 |
| Debt to equity ratio | .007727 | .7363376 | 0.01 | 0.992 | -1.44317 | 1.458624 |
| Earnings per share | -.1423089 | .2062312 | -0.69 | 0.491 | -.5486717 | .2640539 |
| Volume | -1.85e-10 | 1.91e-10 | -0.97 | 0.333 | -5.61e-10 | 1.91e-10 |
| Constant | 13.14924 | 1.122257 | 11.72*** | 0.000*** | 10.93792 | 15.36056 |
| **DENMARK** | | | | | | |
| Resource score | -.0343941 | .0145935 | -2.36** | 0.020** | -.0632263 | -.0055619 |
| Emissions score | .0056652 | .0125558 | 0.45 | 0.652 | -.0191413 | .0304716 |
| Innovation score | .0197851 | .0115701 | 1.71* | 0.089* | -.0030739 | .0426441 |
| Size | -4.97e-11 | 2.06e-11 | -2.42** | 0.017** | -9.03e-11 | -9.08e-12 |
| Beta | -1.712978 | .7039558 | -2.43** | 0.016** | -3.103779 | -.3221763 |
| Returns on assets | 5.865953 | 2.763642 | 2.12** | 0.035** | .4058416 | 11.32606 |

| | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Total debt | 6.55e-11 | 8.66e-11 | 0.76 | 0.451 | -1.06e-10 | 2.37e-10 |
| Debt to equity ratio | .0112486 | .4835448 | 0.02 | 0.981 | -.9440879 | .966585 |
| Earnings per share | .020201 | .0103548 | 1.95* | 0.053* | -.000257 | .0406591 |
| Volume | 2.95e-09 | 1.85e-09 | 1.60 | 0.112 | -6.99e-10 | 6.60e-09 |
| Constant | 15.57255 | 1.272783 | 12.24*** | 0.000*** | 13.05792 | 18.08718 |
| *NORWAY* | | | | | | |
| Resource score | -.0360178 | .0219759 | -1,64 | 0.105 | -.0796903 | .0076547 |
| Emissions score | .0525542 | .0178544 | 2.94*** | 0.004*** | .0170722 | .0880362 |
| Innovation score | -.0055615 | .0181845 | -0.31 | 0.760 | -.0416993 | .0305764 |
| Size | -6.73e-12 | 3.69e-11 | -0.18 | 0.856 | -8.01e-11 | 6.66e-11 |
| Beta | .0772845 | .3688697 | 0.21 | 0.835 | -.6557666 | .8103355 |
| Returns on assets | 3.534143 | 3.973473 | 0.89 | 0.376 | -4.362299 | 11.43059 |
| Total debt | 5.69e-12 | 9.30e-11 | 0.06 | 0.951 | -1.79e-10 | 1.91e-10 |
| Debt to equity ratio | -1.325304 | .9668464 | -1.37 | 0.174 | -3.246708 | .5960998 |
| Earnings per share | -.2717882 | .2850578 | -0.95 | 0.343 | -.8382806 | .2947042 |
| Volume | 2.48e-09 | 2.59e-09 | 0.96 | 0.340 | -2.66e-09 | 7.62e-09 |
| Constant | 13.28085 | 1.464555 | 9.07*** | 0.000*** | 10.37036 | 16.19135 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table H. Regression model: Environmental score and Total number of negative stock price jumps by countries**

| Number of positive stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| Resource score | .017131 | .0064689 | 2.65*** | 0.008*** | .004406 | .029856 |
| Emissions score | -.0053192 | .00617 | -0.86 | 0.389 | -.0174561 | .0068178 |
| Innovation score | -.0076897 | .0060081 | -1.28 | 0.201 | -.0195082 | .0041288 |
| Size | -4.83e-11 | 1.79e-11 | -2.69*** | 0.007*** | -8.36e-11 | -1.30e-11 |
| Beta | .5106564 | .3299004 | 1.55 | 0.123 | -.138288 | 1.159601 |
| Returns on assets | 3.958545 | 3.317903 | 1.19 | 0.234 | -.138288 | 10.48516 |
| Total debt | 6.85e-11 | 4.62e-11 | 1.48 | 0.139 | -2.568075 | 1.59e-10 |
| Debt to equity ratio | -.0200756 | .0441428 | -0.45 | 0.650 | -.1069085 | .0667574 |
| Earnings per share | -.0009042 | .0067857 | -0.13 | 0.894 | -.0142523 | .012444 |
| Volume | 2.59e-10 | 1.11e-10 | 2.33** | 0.020** | 4.02e-11 | 4.78e-10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Constant* | 5.175541 | .6177842 | 8.38*** | 0.000*** | 3.960303 | 6.39078 |

<div align="center">

***FINLAND***

</div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *Resource score* | .0187986 | .0102078 | 1.84* | 0.067* | -.0013151 | .0389122 |
| *Emissions score* | -.0172605 | .0097834 | -1.76* | 0.079* | -.0365381 | .002017 |
| *Innovation score* | .0125767 | .0069872 | 1.80* | 0.073* | -.001191 | .0263444 |
| *Size* | -6.54e-11 | 2.91e-11 | -2.24** | 0.026** | -1.23e-10 | -7.99e-12 |
| *Beta* | -.3144664 | .3636947 | -0.86 | 0.388 | -4.335395 | .402166 |
| *Returns on assets* | 2.110351 | 3.27125 | 0.65 | 0.519 | 2.98e-11 | 8.556098 |
| *Total debt* | 2.08e-10 | 9.04e-11 | 2.30** | 0.022** | 2.98e-11 | 3.86e-10 |
| *Debt to equity ratio* | .3844839 | .549298 | 0.70 | 0.485 | -.6978655 | 1.466833 |
| *Earnings per share* | .0607652 | .1538457 | 0.39 | 0.693 | -.242376 | .3639064 |
| *Volume* | 4.09e-11 | 1.42e-10 | 0.29 | 0.774 | -2.40e-10 | 3.21e-10 |
| *Constant* | 5.240299 | .8371884 | 6.26*** | 0.000*** | 3.590684 | 6.889915 |

<div align="center">

***DENMARK***

</div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *Resource score* | -.0111809 | .0105317 | -1.06 | 0.290 | -.0319883 | .0096265 |
| *Emissions score* | -.0020645 | .0090612 | -0.23 | 0.820 | -.0199667 | .0158376 |
| *Innovation score* | .0043185 | .0083498 | 0.52 | 0.606 | -.0121783 | .0208152 |
| *Size* | -4.44e-11 | 1.48e-11 | -2.99*** | 0.003*** | -7.37e-11 | -1.51e-11 |
| *Beta* | -.8229085 | .5080252 | -1.62 | 0.107 | -1.826611 | .1807938 |
| *Returns on assets* | 5.548217 | 1.994443 | 2.78*** | 0.006*** | 1.607808 | 9.488627 |
| *Total debt* | 6.87e-11 | 6.25e-11 | 1.10 | 0.273 | -5.48e-11 | 1.92e-10 |
| *Debt to equity ratio* | .0661198 | .3489607 | 0.19 | 0.850 | -.6233197 | .7555594 |
| *Earnings per share* | .008416 | .0074728 | 1.13 | 0.262 | -.0063479 | .02318 |
| *Volume* | 8.04e-10 | 1.33e-09 | 0.60 | 0.547 | -1.83e-09 | 3.44e-09 |
| *Constant* | 7.282573 | .9185317 | 7.93*** | 0.000*** | 5.467836 | 9.097311 |

<div align="center">

***NORWAY***

</div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *Resource score* | -.0182912 | .0184684 | -0.99 | 0.325 | -.0549932 | .0184108 |
| *Emissions score* | .042632 | .0150047 | 2.84*** | 0.006*** | .0128133 | .0724508 |
| *Innovation score* | -.0054062 | .0152821 | -0.35 | 0.724 | -.0357762 | .0249638 |
| *Size* | 3.40e-11 | 3.10e-11 | 1.10 | 0.276 | -2.76e-11 | 9.56e-11 |
| *Beta* | .1110197 | .3099952 | 0.36 | 0.721 | -.5050307 | .7270701 |
| *Returns on assets* | -2.709812 | 3.339276 | -0.81 | 0.419 | -9.345921 | 3.926297 |
| *Total debt* | -9.17e-11 | 7.82e-11 | -1.17 | 0.244 | -2.47e-10 | 6.37e-11 |

| | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Debt to equity ratio | -.4794503 | .8125302 | -0.59 | 0.557 | -2.094183 | 1.135283 |
| Earnings per share | .2276727 | .2395603 | 0.95 | 0.345 | -.2484031 | .7037485 |
| Volume | 2.24e-09 | 2.17e-09 | 1.03 | 0.306 | -2.08e-09 | 6.56e-09 |
| Constant | 5.019878 | 1.230801 | 4.08*** | 0.000*** | 2.57392 | 7.465836 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table I. Regression model: Environmental score and Total number of negative stock price jumps by countries**

| Number of negative stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | *SWEDEN* | | | |
| Resource score | .0131393 | .0070688 | 1.86* | 0.064* | -.0007657 | .0270442 |
| Emissions score | .0014719 | .0067421 | 0.22 | 0.827 | -.0117905 | .0147344 |
| Innovation score | -.0175373 | .0065652 | -2.67*** | 0.008*** | -.0304517 | -.0046229 |
| Size | -1.52e-11 | 1.96e-11 | -0.78 | 0.438 | -5.38e-11 | 2.33e-11 |
| Beta | .1049271 | .360492 | 0.29 | 0.771 | -.6041937 | .8140479 |
| Returns on assets | -5.636715 | 3.625571 | -1.55 | 0.121 | -12.76855 | 1.495116 |
| Total debt | -2.19e-12 | 5.05e-11 | -0.04 | 0.965 | -1.02e-10 | 9.72e-11 |
| Debt to equity ratio | .0085336 | .0482362 | 0.18 | 0.860 | -.0863514 | .1034185 |
| Earnings per share | .0011703 | .007415 | 0.16 | 0.875 | -.0134156 | .0157562 |
| Volume | -1.24e-10 | 1.21e-10 | -1.02 | 0.309 | -3.63e-10 | 1.15e-10 |
| Constant | 7.323736 | .6750711 | 10.85*** | 0.000*** | 5.995809 | 8.651663 |
| | | | *FINLAND* | | | |
| Resource score | -.0053016 | .0100666 | -0.53 | 0.599 | -.0251371 | .014534 |
| Emissions score | -.0053001 | .0096482 | -0.55 | 0.583 | -.0243111 | .0137108 |
| Innovation score | -.0113701 | .0068906 | -1.65 | 0.100 | -.0249475 | .0022072 |
| Size | 4.14e-11 | 2.87e-11 | 1.44 | 0.151 | -1.52e-11 | 9.80e-11 |
| Beta | .5712483 | .3586656 | 1.59 | 0.113 | -.1354747 | 1.277971 |
| Returns on assets | -2.092261 | 3.226016 | -0.65 | 0.517 | -8.448877 | 4.264356 |
| Total debt | -6.24e-11 | 8.91e-11 | -0.70 | 0.484 | -2.38e-10 | 1.13e-10 |
| Debt to equity ratio | -.3767569 | .5417024 | -0.70 | 0.487 | -1.44414 | .6906261 |
| Earnings per share | -.2030741 | .1517184 | -1.34 | 0.182 | -.5020235 | .0958753 |
| Volume | -2.26e-10 | 1.40e-10 | -1.61 | 0.109 | -5.02e-10 | 5.07e-11 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Constant* | 7.90894 | .825612 | 9.58*** | 0.000*** | 6.282135 | 9.535745 |

| DENMARK | | | | | | |
|---|---|---|---|---|---|---|
| *Resource score* | -.0232132 | .012994 | -1.79* | 0.076* | -.0488853 | .0024589 |
| *Emissions score* | .0077297 | .0111797 | 0.69 | 0.490 | -.0143579 | .0298173 |
| *Innovation score* | .0154666 | .010302 | 1.50 | 0.135 | -.004887 | .0358202 |
| *Size* | -5.31e-12 | 1.83e-11 | -0.29 | 0.772 | -4.15e-11 | 3.08e-11 |
| *Beta* | -.890069 | .6267993 | -1.42 | 0.158 | -2.128433 | .3482946 |
| *Returns on assets* | .3177355 | 2.460736 | 0.13 | 0.897 | -4.543925 | 5.179396 |
| *Total debt* | -3.21e-12 | 7.71e-11 | -0.04 | 0.967 | -1.56e-10 | 1.49e-10 |
| *Debt to equity ratio* | -.0548712 | .4305462 | -0.13 | 0.899 | -.9054988 | .7957564 |
| *Earnings per share* | .011785 | .0092199 | 1.28 | 0.203 | -.0064307 | .0300007 |
| *Volume* | 2.15e-09 | 1.64e-09 | 1.30 | 0.194 | -1.10e-09 | 5.40e-09 |
| *Constant* | 8.289973 | 1.133281 | 7.32*** | 0.000*** | 6.050958 | 10.52899 |

| NORWAY | | | | | | |
|---|---|---|---|---|---|---|
| *Resource score* | -.0177266 | .0182845 | -0.97 | 0.335 | -.0540632 | .01861 |
| *Emissions score* | .0099221 | .0148553 | 0.67 | 0.506 | -.0195997 | .039444 |
| *Innovation score* | -.0001553 | .01513 | -0.01 | 0.992 | -.0302229 | .0299123 |
| *Size* | -4.07e-11 | 3.07e-11 | -1.33 | 0.188 | -1.02e-10 | 2.03e-11 |
| *Beta* | -.0337353 | .3069089 | -0.11 | 0.913 | -.6436521 | .5761816 |
| *Returns on assets* | 6.243955 | 3.306029 | 1.89* | 0.062* | -.326083 | 12.81399 |
| *Total debt* | 9.74e-11 | 7.74e-11 | 1.26 | 0.212 | -5.65e-11 | 2.51e-10 |
| *Debt to equity ratio* | -.845854 | .8044405 | -1.05 | 0.296 | -2.44451 | .7528024 |
| *Earnings per share* | -.499461 | .2371752 | -2.11** | 0.038** | -.9707968 | -.0281251 |
| *Volume* | 2.41e-10 | 2.15e-09 | 0.11 | 0.911 | -4.04e-09 | 4.52e-09 |
| *Constant* | 8.260975 | 1.218547 | 6.78*** | 0.000*** | 5.839369 | 10.68258 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table J. Regression model: Social score and Total number of stock price jumps by countries**

| *Number of stock price jumps* | *Coefficient* | *Std. err.* | *t* | *P>|t|* | *[95% Conf. Interval]* | |
|---|---|---|---|---|---|---|
| SWEDEN | | | | | | |
| *Workforce score* | .0147134 | .0079107 | 1.86* | 0.064* | -.0008478 | .0302746 |
| *Human rights score* | -.0053432 | .0090641 | -0.59 | 0.556 | -.0231733 | .0124869 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| *Community score* | .0134658 | .0073118 | 1.84* | 0.066* | -.0009174 | .0278489 |
| *Product responsibility score* | -.0106629 | .0070185 | -1.52 | 0.130 | -.0244691 | .0031433 |
| *Size* | -7.46e-11 | 2.64e-11 | -2.82*** | 0.005*** | -1.27e-10 | -2.26e-11 |
| *Beta* | .7119086 | .491148 | 1.45 | 0.148 | -.2542351 | 1.678052 |
| *Returns on assets* | 2.034426 | 4.802323 | 0.42 | 0.672 | -7.412288 | 11.48114 |
| *Total debt* | 7.57e-11 | 6.79e-11 | 1.11 | 0.266 | -5.79e-11 | 2.09e-10 |
| *Debt to equity ratio* | .0132154 | .0635551 | 0.21 | 0.835 | -.1118048 | .1382356 |
| *Earnings per share* | -.0020654 | .0097619 | -0.21 | 0.833 | -.0212682 | .0171374 |
| *Volume* | 1.07e-10 | 1.60e-10 | 0.67 | 0.505 | -2.07e-10 | 4.21e-10 |
| *Constant* | 11.68276 | .8676122 | 13.47*** | 0.000*** | 9.976069 | 13.38945 |

### *FINLAND*

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | .0019905 | .0099703 | 0.20 | 0.842 | -.0176557 | .0216367 |
| *Human rights score* | .0005655 | .0094841 | 0.06 | 0.953 | -.0181228 | .0192537 |
| *Community score* | -.014605 | .007993 | -1.83* | 0.069* | -.0303549 | .001145 |
| *Product responsibility score* | -.0073218 | .0075836 | -0.97 | 0.335 | -.0222651 | .0076214 |
| *Size* | -1.50e-11 | 3.81e-11 | -0.39 | 0.694 | -9.01e-11 | 6.01e-11 |
| *Beta* | .5470586 | .4706577 | 1.16 | 0.246 | -.380358 | 1.474475 |
| *Returns on assets* | -1.074058 | 4.496959 | -0.24 | 0.811 | -9.935179 | 7.787063 |
| *Total debt* | 6.11e-11 | 1.21e-10 | 0.50 | 0.614 | -1.77e-10 | 3.00e-10 |
| *Debt to equity ratio* | .2582645 | .7169518 | 0.36 | 0.719 | -1.154467 | 1.670996 |
| *Earnings per share* | -.1447316 | .1978692 | -0.73 | 0.465 | -.5346269 | .2451636 |
| *Volume* | -6.55e-11 | 1.97e-10 | -0.33 | 0.739 | -4.53e-10 | 3.22e-10 |
| *Constant* | 13.17356 | 1.161959 | 11.34*** | 0.000*** | 10.88395 | 15.46316 |

### *DENMARK*

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | .0092322 | .0124399 | 0.74 | 0.459 | -.0153466 | .033811 |
| *Human rights score* | -.0090801 | .013902 | -0.65 | 0.515 | -.0365476 | .0183874 |
| *Community score* | -.0191979 | .0113906 | -1.69* | 0.094* | -.0417034 | .0033076 |
| *Product responsibility score* | -.0168484 | .0110457 | -1.53 | 0.129 | -.0386725 | .0049757 |
| *Size* | -4.98e-11 | 2.03e-11 | -2.46** | 0.015** | -8.98e-11 | -9.73e-12 |
| *Beta* | -1.684195 | .7069237 | -2.38** | 0.018** | -3.080934 | -.2874561 |

| | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| Returns on assets | 5.418515 | 2.892681 | 1.87* | 0.063* | -.2968403 | 11.13387 |
| Total debt | 1.11e-10 | 9.13e-11 | 1.21 | 0.227 | -6.96e-11 | 2.91e-10 |
| Debt to equity ratio | -.382503 | .5209495 | -0.73 | 0.464 | -1.411794 | .6467884 |
| Earnings per share | .0220659 | .0103213 | 2.14** | 0.034** | .0016731 | .0424587 |
| Volume | 3.27e-09 | 1.90e-09 | 1.72 | 0.087 | -4.81e-10 | 7.03e-09 |
| Constant | 16.21791 | 1.288315 | 12.59*** | 0.000*** | 13.67246 | 18.76336 |
| *NORWAY* | | | | | | |
| Workforce score | .009039 | .0135794 | 0.67 | 0.507 | -.0179516 | .0360296 |
| Human rights score | .0286424 | .0164307 | 1.74* | 0.085* | -.0040154 | .0613003 |
| Community score | .0023959 | .0156827 | 0.15 | 0.879 | -.0287751 | .0335669 |
| Product responsibility score | -.0077102 | .0152368 | -0.51 | 0.614 | -.0379949 | .0225745 |
| Size | -1.83e-11 | 3.76e-11 | -0.49 | 0.628 | -9.30e-11 | 5.64e-11 |
| Beta | .1359121 | .3423547 | 0.40 | 0.692 | -.5445549 | .8163791 |
| Returns on assets | 4.627465 | 4.000642 | 1.16 | 0.251 | -3.324245 | 12.57917 |
| Total debt | -1.60e-11 | 9.74e-11 | -0.16 | 0.870 | -2.10e-10 | 1.78e-10 |
| Debt to equity ratio | -1.465401 | 1.102456 | -1.33 | 0.187 | -3.656653 | .7258504 |
| Earnings per share | -.3424432 | .2751989 | -1.24 | 0.217 | -.8894307 | .2045444 |
| Volume | 6.03e-10 | 2.86e-09 | 0.21 | 0.833 | -5.08e-09 | 6.28e-09 |
| Constant | 11.80675 | 1.451225 | 8.14*** | 0.000*** | 8.922285 | 14.69122 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table K. Regression model: Social score and Total number of positive stock price jumps by countries**

| Number of positive stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| Workforce score | .0083094 | .0055089 | 1.51 | 0.132 | -.0025272 | .0191461 |
| Human rights score | .00226 | .0063121 | 0.36 | 0.721 | -.0101566 | .0146767 |
| Community score | .0025888 | .0050919 | 0.51 | 0.611 | -.0074274 | .0126051 |
| Product responsibility score | -.0110223 | .0048876 | -2.26** | 0.025** | -.0206368 | -.0014078 |
| Size | -4.68e-11 | 1.84e-11 | -2.54 | 0.011 | -8.30e-11 | -1.06e-11 |
| Beta | .4060801 | .3420301 | 1.19 | 0.236 | -.2667319 | 1.078892 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Returns on assets | 5.888467 | 3.344286 | 1.76* | 0.079* | -.6901217 | 12.46706 |
| Total debt | 8.87e-11 | 4.73e-11 | 1.88* | 0.061* | | 1.82e-10 |
| Debt to equity ratio | -.0151459 | .0442591 | -0.34 | 0.732 | -.1022086 | .0719168 |
| Earnings per share | -.0020687 | .0067981 | -0.30 | 0.761 | -.0154413 | .0113039 |
| Volume | 2.40e-10 | 1.11e-10 | 2.16** | 0.032** | 2.13e-11 | 4.59e-10 |
| Constant | 5.203388 | .6041957 | 8.61*** | 0.000*** | 4.014866 | 6.391909 |

### FINLAND

| | | | | | | |
|---|---|---|---|---|---|---|
| Workforce score | .0079267 | .0075499 | 1.05 | 0.295 | -.0069502 | .0228037 |
| Human rights score | .0038567 | .0071818 | 0.54 | 0.592 | -.0102948 | .0180082 |
| Community score | -.0090097 | .0060526 | -1.49 | 0.138 | -.0209363 | .0029168 |
| Product responsibility score | .0016775 | .0057426 | 0.29 | 0.770 | -.0096381 | .0129932 |
| Size | -4.61e-11 | 2.89e-11 | -1.60 | 0.112 | -1.03e-10 | 1.08e-11 |
| Beta | .1268555 | .3564018 | 0.36 | 0.722 | -.5754233 | .8291342 |
| Returns on assets | -.4633226 | 3.405286 | -0.14 | 0.892 | -7.173336 | 6.24669 |
| Total debt | 1.39e-10 | 9.17e-11 | 1.51 | 0.132 | -4.19e-11 | 3.19e-10 |
| Debt to equity ratio | .5116438 | .542906 | 0.94 | 0.347 | -.5581359 | 1.581424 |
| Earnings per share | .161627 | .1498349 | 1.08 | 0.282 | -.133618 | .4568721 |
| Volume | 8.39e-11 | 1.49e-10 | 0.56 | 0.573 | -2.09e-10 | 3.77e-10 |
| Constant | 5.223194 | .8798842 | 5.94*** | 0.000*** | 3.489409 | 6.956979 |

### DENMARK

| | | | | | | |
|---|---|---|---|---|---|---|
| Workforce score | .0045013 | .0087917 | 0.51 | 0.609 | -.0128693 | .0218718 |
| Human rights score | -.0067298 | .0098249 | -0.68 | 0.494 | -.0261418 | .0126823 |
| Community score | -.0175732 | .00805 | -2.18** | 0.031** | -.0334785 | -.001668 |
| Product responsibility score | -.0072048 | .0078063 | -0.92 | 0.358 | -.0226286 | .0082189 |
| Size | -4.57e-11 | 1.43e-11 | -3.19*** | 0.002*** | -7.40e-11 | -1.74e-11 |
| Beta | -.72807 | .4996033 | -1.46 | 0.147 | -1.715186 | .2590456 |
| Returns on assets | 6.098103 | 2.04434 | 2.98*** | 0.003*** | 2.058897 | 10.13731 |
| Total debt | 1.08e-10 | 6.46e-11 | 1.68 | 0.095 | -1.91e-11 | 2.36e-10 |
| Debt to equity ratio | -.2269278 | .3681699 | -0.62 | 0.539 | -.9543575 | .500502 |
| Earnings per share | .0084363 | .0072944 | 1.16 | 0.249 | -.0059759 | .0228485 |
| Volume | 1.48e-09 | 1.34e-09 | 1.10 | 0.271 | -1.17e-09 | 4.14e-09 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| *Constant* | 7.70847 | .910489 | 8.47*** | 0.000*** | 5.909526 | 9.507413 |

<div align="center"><b><i>NORWAY</i></b></div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | .0242081 | .0112098 | 2.16** | 0.034** | .0019274 | .0464889 |
| *Human rights score* | .0162755 | .0135636 | 1.20 | 0.233 | -.0106836 | .0432345 |
| *Community score* | -.0011431 | .0129461 | -0.09 | 0.930 | -.0268748 | .0245885 |
| *Product responsibility score* | -.0063299 | .0125779 | -0.50 | 0.616 | -.03133 | .0186701 |
| *Size* | 1.78e-11 | 3.10e-11 | 0.57 | 0.567 | -4.39e-11 | 7.95e-11 |
| *Beta* | .153644 | .2826138 | 0.54 | 0.588 | -.4080816 | .7153696 |
| *Returns on assets* | -1.894124 | 3.302531 | -0.57 | 0.568 | -8.458261 | 4.670014 |
| *Total debt* | -8.62e-11 | 8.04e-11 | -1.07 | 0.287 | -2.46e-10 | 7.37e-11 |
| *Debt to equity ratio* | -.7822429 | .910078 | -0.86 | 0.392 | -2.591121 | 1.026636 |
| *Earnings per share* | .1382823 | .2271767 | 0.61 | 0.544 | -.313256 | .5898206 |
| *Volume* | 4.85e-10 | 2.36e-09 | 0.21 | 0.838 | -4.20e-09 | 5.17e-09 |
| *Constant* | 4.204527 | 1.197987 | 3.51*** | 0.001*** | 1.823399 | 6.585655 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table L. Regression model: Social score and Total number of negative stock price jumps by countries**

| *Number of negative stock price jumps* | *Coefficient* | *Std. err.* | *t* | *P>\|t\|* | *[95% Conf. Interval]* | |
|---|---|---|---|---|---|---|

<div align="center"><b><i>SWEDEN</i></b></div>

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | .006404 | .0060303 | 1.06 | 0.289 | -.0054583 | .0182662 |
| *Human rights score* | -.0076032 | .0069095 | -1.10 | 0.272 | -.021195 | .0059885 |
| *Community score* | .010877 | .0055737 | 1.95* | 0.052* | -.0000872 | .0218411 |
| *Product responsibility score* | .0003594 | .0053502 | 0.07 | 0.946 | -.010165 | .0108838 |
| *Size* | -2.78e-11 | 2.01e-11 | -1.38 | 0.168 | -6.74e-11 | 1.18e-11 |
| *Beta* | .3058286 | .374399 | 0.82 | 0.415 | -.4306568 | 1.042314 |
| *Returns on assets* | -3.854041 | 3.660781 | -1.05 | 0.293 | -11.05521 | 3.34713 |
| *Total debt* | -1.31e-11 | 5.17e-11 | -0.25 | 0.801 | -1.15e-10 | 8.87e-11 |
| *Debt to equity ratio* | .0283613 | .0484477 | 0.59 | 0.559 | -.0669408 | .1236634 |
| *Earnings per share* | 3.28e-06 | .0074415 | 0.00 | 1.000 | -.0146349 | .0146415 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Volume* | -1.33e-10 | 1.22e-10 | -1.10 | 0.273 | -3.73e-10 | 1.06e-10 |
| *Constant* | 6.479373 | .6613754 | 9.80*** | 0.000*** | 5.178373 | 7.780373 |

**FINLAND**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | -.0059362 | .0073503 | -0.81 | 0.420 | -.0204198 | .0085473 |
| *Human rights score* | -.0032912 | .0069919 | -0.47 | 0.638 | -.0170685 | .0104861 |
| *Community score* | -.0055952 | .0058926 | -0.95 | 0.343 | -.0172064 | .0060159 |
| *Product responsibility score* | -.0089994 | .0055908 | -1.61 | 0.109 | -.0200158 | .0020171 |
| *Size* | 3.11e-11 | 2.81e-11 | 1.11 | 0.270 | -2.43e-11 | 8.64e-11 |
| *Beta* | .4202032 | .3469772 | 1.21 | 0.227 | -.2635047 | 1.103911 |
| *Returns on assets* | -.6107357 | 3.315238 | -0.18 | 0.854 | -7.143311 | 5.921839 |
| *Total debt* | -7.76e-11 | 8.92e-11 | -0.87 | 0.385 | -2.53e-10 | 9.82e-11 |
| *Debt to equity ratio* | -.2533793 | .5285495 | -0.48 | 0.632 | -1.29487 | .7881115 |
| *Earnings per share* | -.3063587 | .1458727 | -2.10** | 0.037** | -.5937963 | -.018921 |
| *Volume* | -1.49e-10 | 1.45e-10 | -1.03 | 0.304 | -4.35e-10 | 1.36e-10 |
| *Constant* | 7.950363 | .8566168 | 9.28*** | 0.000*** | 6.262425 | 9.6383 |

**DENMARK**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | .004731 | .0111762 | 0.42 | 0.673 | -.017351 | .026813 |
| *Human rights score* | -.0023504 | .0124898 | -0.19 | 0.851 | -.0270276 | .0223269 |
| *Community score* | -.0016247 | .0102335 | -0.16 | 0.874 | -.021844 | .0185946 |
| *Product responsibility score* | -.0096435 | .0099237 | -0.97 | 0.333 | -.0292507 | .0099636 |
| *Size* | -4.06e-12 | 1.82e-11 | -0.22 | 0.824 | -4.00e-11 | 3.19e-11 |
| *Beta* | -.9561253 | .6351127 | -1.51 | 0.134 | -2.21098 | .2987297 |
| *Returns on assets* | -.6795875 | 2.598835 | -0.26 | 0.794 | -5.814363 | 4.455188 |
| *Total debt* | 2.44e-12 | 8.21e-11 | 0.03 | 0.976 | -1.60e-10 | 1.65e-10 |
| *Debt to equity ratio* | -.1555753 | .4680301 | -0.33 | 0.740 | -1.080309 | .7691582 |
| *Earnings per share* | .0136295 | .0092728 | 1.47 | 0.144 | -.0046917 | .0319508 |
| *Volume* | 1.79e-09 | 1.71e-09 | 1.05 | 0.296 | -1.58e-09 | 5.16e-09 |
| *Constant* | 8.509439 | 1.157445 | 7.35*** | 0.000*** | 6.222561 | 10.79632 |

**NORWAY**

| | | | | | | |
|---|---|---|---|---|---|---|
| *Workforce score* | -.0151691 | .0109394 | -1.39 | 0.169 | -.0369123 | .0065742 |
| *Human rights score* | .012367 | .0132364 | 0.93 | 0.353 | -.0139417 | .0386757 |

| | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| Community score | .003539 | .0126337 | 0.28 | 0.780 | -.0215719 | .0286499 |
| Product responsibility score | -.0013803 | .0122745 | -0.11 | 0.911 | -.0257772 | .0230166 |
| Size | -3.61e-11 | 3.03e-11 | -1.19 | 0.236 | -9.63e-11 | 2.41e-11 |
| Beta | -.0177319 | .275796 | -0.06 | 0.949 | -.5659064 | .5304426 |
| Returns on assets | 6.521589 | 3.22286 | 2.02** | 0.046** | .1158049 | 12.92737 |
| Total debt | 7.02e-11 | 7.85e-11 | 0.89 | 0.373 | -8.58e-11 | 2.26e-10 |
| Debt to equity ratio | -.6831582 | .8881232 | -0.77 | 0.444 | -2.448399 | 1.082083 |
| Earnings per share | -.4807255 | .2216963 | -2.17** | 0.033** | -.9213708 | -.0400801 |
| Volume | 1.18e-10 | 2.30e-09 | 0.05 | 0.959 | -4.46e-09 | 4.69e-09 |
| Constant | 7.602225 | 1.169086 | 6.50*** | 0.000*** | 5.27854 | 9.92591 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table M. Regression model: Governance score and Total number of stock price jumps by countries**

| Number of stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | *SWEDEN* | | | |
| Management score | -.0043114 | .0059254 | -0.73 | 0.467 | -.0159673 | .0073444 |
| Shareholders score | .0035325 | .0057187 | 0.62 | 0.537 | -.0077168 | .0147817 |
| CSR strategy score | .011899 | .0066964 | 1.78* | 0.076* | -.0012736 | .0250715 |
| Size | -6.62e-11 | 2.69e-11 | -2.46** | 0.014** | -1.19e-10 | -1.34e-11 |
| Beta | .7667129 | .50368 | 1.52 | 0.129 | -.2240719 | 1.757498 |
| Returns on assets | 1.921754 | 4.769375 | 0.40 | 0.687 | -7.460044 | 11.30355 |
| Total debt | 6.49e-11 | 6.71e-11 | 0.97 | 0.335 | -6.72e-11 | 1.97e-10 |
| Debt to equity ratio | .0215381 | .0642181 | 0.34 | 0.738 | -.1047848 | .147861 |
| Earnings per share | -.0019915 | .0097593 | -0.20 | 0.838 | -.021189 | .017206 |
| Volume | 7.71e-11 | 1.63e-10 | 0.47 | 0.636 | -2.43e-10 | 3.97e-10 |
| Constant | 11.79987 | .8734475 | 13.51*** | 0.000*** | 10.08172 | 13.51802 |
| | | | *FINLAND* | | | |
| Management score | -.0033353 | .0072301 | -0.46 | 0.645 | -.0175818 | .0109111 |
| Shareholders score | -.0045964 | .0073129 | -0.63 | 0.530 | -.0190059 | .0098131 |
| CSR strategy score | .0072288 | .0076577 | 0.94 | 0.346 | -.0078601 | .0223178 |
| Size | -2.51e-11 | 3.84e-11 | -0.65 | 0.514 | -1.01e-10 | 5.05e-11 |

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| | | | | | | |
|---|---|---|---|---|---|---|
| *Beta* | .2884923 | .4879766 | 0.59 | 0.555 | -.6730281 | 1.250013 |
| *Returns on assets* | -.5609124 | 4.285422 | -0.13 | 0.896 | -9.005007 | 7.883182 |
| *Total debt* | 9.32e-11 | 1.25e-10 | 0.75 | 0.456 | -1.53e-10 | 3.39e-10 |
| *Debt to equity ratio* | .5056115 | .7477765 | 0.68 | 0.500 | -.9678247 | 1.979048 |
| *Earnings per share* | -.0693996 | .2016349 | -0.34 | 0.731 | -.4667058 | .3279065 |
| *Volume* | -1.49e-10 | 1.94e-10 | -0.77 | 0.445 | -5.32e-10 | 2.34e-10 |
| *Constant* | 12.33386 | 1.008426 | 12.23*** | 0.000*** | 10.34683 | 14.32088 |
| ***DENMARK*** | | | | | | |
| *Management score* | .0029722 | .0093023 | 0.32 | 0.750 | -.0154062 | .0213507 |
| *Shareholders score* | .0113631 | .0112952 | 1.01 | 0.316 | -.0109528 | .0336789 |
| *CSR strategy score* | -.0091493 | .0110834 | -0.83 | 0.410 | -.0310467 | .0127482 |
| *Size* | -4.57e-11 | 2.13e-11 | -2.15** | 0.033** | -8.77e-11 | -3.63e-12 |
| *Beta* | -1.618098 | .7443304 | -2.17** | 0.031** | -3.088667 | -.147529 |
| *Returns on assets* | 5.183051 | 2.866892 | 1.81* | 0.073* | -.4810514 | 10.84715 |
| *Total debt* | 1.07e-10 | 9.11e-11 | 1.18 | 0.242 | -7.29e-11 | 2.87e-10 |
| *Debt to equity ratio* | -.0049137 | .4952008 | -0.01 | 0.992 | -.9832789 | .9734515 |
| *Earnings per share* | .0212957 | .0104824 | 2.03** | 0.044** | .0005857 | .0420056 |
| *Volume* | 1.95e-09 | 1.92e-09 | 1.02 | 0.311 | -1.84e-09 | 5.74e-09 |
| *Constant* | 14.29678 | 1.298513 | 11.01*** | 0.000*** | 11.73132 | 16.86225 |
| ***NORWAY*** | | | | | | |
| *Management score* | -.0115128 | .0122079 | -0.94 | 0.348 | -.0357734 | .0127478 |
| *Shareholders score* | .0211 | .0114574 | 1.84* | 0.069* | -.0016692 | .0438691 |
| *CSR strategy score* | .0352945 | .0127356 | 2.77*** | 0.007*** | .0099852 | .0606037 |
| *Size* | -1.50e-11 | 3.67e-11 | -0.41 | 0.684 | -8.80e-11 | 5.80e-11 |
| *Beta* | -.2609224 | .4252117 | -0.61 | 0.541 | -1.105941 | .5840965 |
| *Returns on assets* | 4.738392 | 3.732379 | 1.27 | 0.208 | -2.678927 | 12.15571 |
| *Total debt* | -4.71e-11 | 9.25e-11 | -0.51 | 0.611 | -2.31e-10 | 1.37e-10 |
| *Debt to equity ratio* | -1.493468 | .9534427 | -1.57 | 0.121 | -3.388235 | .4012986 |
| *Earnings per share* | -.3432258 | .2460616 | -1.39 | 0.167 | -.8322216 | .14577 |
| *Volume* | -6.32e-10 | 2.57e-09 | -0.25 | 0.806 | -5.74e-09 | 4.48e-09 |
| *Constant* | 12.61783 | .8986534 | 14.04*** | 0.000*** | 10.83195 | 14.40372 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table N. Regression model: Governance score and Total number of positive stock price jumps by countries**

| Number of positive stock price jumps | Coefficient | Std. err. | t | P>\|t\| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| | | | *SWEDEN* | | | |
| Management score | -.0005569 | .0041254 | 0.13 | 0.893 | -.0086719 | .0075582 |
| Shareholders score | .0011623 | .0039815 | 0.29 | 0.771 | -.0066697 | .0089943 |
| CSR strategy score | .0055843 | .0046622 | 1.20 | 0.232 | -.0035867 | .0147554 |
| Size | -4.80e-11 | 1.87e-11 | -2.56** | 0.011** | -8.48e-11 | -1.12e-11 |
| Beta | .5930839 | .3506747 | 1.69 | 0.092 | -.0967255 | 1.282893 |
| Returns on assets | 5.355668 | 3.320559 | 1.61 | 0.108 | -1.176176 | 11.88751 |
| Total debt | 7.16e-11 | 4.67e-11 | 1.53 | 0.127 | -2.04e-11 | 1.63e-10 |
| Debt to equity ratio | -.0039172 | .0447102 | -0.09 | 0.930 | -.0918663 | .084032 |
| Earnings per share | -.0008594 | .0067947 | -0.13 | 0.899 | -.0142251 | .0125064 |
| Volume | 2.24e-10 | 1.13e-10 | 1.98** | 0.048** | 1.50e-12 | 4.47e-10 |
| Constant | 5.036284 | .6081161 | 8.28*** | 0.000*** | 3.840063 | 6.232504 |
| | | | *FINLAND* | | | |
| Management score | -.0096187 | .0053916 | -1.78* | 0.076* | -.0202425 | .0010051 |
| Shareholders score | .0006231 | .0054533 | 0.11 | 0.909 | -.0101223 | .0113684 |
| CSR strategy score | .0133262 | .0057105 | 2.33** | 0.020** | .0020741 | .0245782 |
| Size | -5.90e-11 | 2.86e-11 | -2.06** | 0.040** | -1.15e-10 | -2.65e-12 |
| Beta | -.145433 | .3638913 | -0.40 | 0.690 | -.8624527 | .5715868 |
| Returns on assets | .8654405 | 3.195701 | 0.27 | 0.787 | -5.431444 | 7.162325 |
| Total debt | 1.63e-10 | 9.31e-11 | 1.75* | 0.081* | -2.03e-11 | 3.47e-10 |
| Debt to equity ratio | .8327497 | .5576279 | 1.49 | 0.137 | -.2660132 | 1.931513 |
| Earnings per share | .200718 | .1503621 | 1.33 | 0.183 | -.0955589 | .496995 |
| Volume | 8.43e-11 | 1.45e-10 | 0.58 | 0.561 | -2.01e-10 | 3.70e-10 |
| Constant | 5.444342 | .7519981 | 7.24*** | 0.000*** | 3.962587 | 6.926096 |
| | | | *DENMARK* | | | |
| Management score | .0036778 | .0065801 | 0.56 | 0.577 | -.0093224 | .0166781 |
| Shareholders score | -.000553 | .0079898 | -0.07 | 0.945 | -.0163385 | .0152324 |
| CSR strategy score | -.0131969 | .00784 | -1.68* | 0.094* | -.0286864 | .0022926 |
| Size | -4.63e-11 | 1.51e-11 | -3.07*** | 0.003*** | -7.60e-11 | -1.65e-11 |
| Beta | -.9160292 | .5265136 | -1.74* | 0.084* | -1.956259 | .1242005 |
| Returns on assets | 5.74799 | 2.02794 | 2.83*** | 0.005*** | 1.7414 | 9.754579 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Total debt | 1.01e-10 | 6.44e-11 | 1.58 | 0.117 | -2.58e-11 | 2.29e-10 |
| Debt to equity ratio | .0274088 | .3502879 | 0.08 | 0.938 | -.6646529 | .7194704 |
| Earnings per share | .0069026 | .0074149 | 0.93 | 0.353 | -.0077469 | .0215521 |
| Volume | 7.98e-10 | 1.36e-09 | 0.59 | 0.558 | -1.88e-09 | 3.48e-09 |
| Constant | 7.256216 | .9185232 | 7.90*** | 0.000*** | 5.441495 | 9.070937 |
| *NORWAY* | | | | | | |
| Management score | .0180493 | .0105987 | 1.70* | 0.092* | -.0030134 | .0391119 |
| Shareholders score | .0204063 | .0099471 | 2.05** | 0.043** | .0006384 | .0401741 |
| CSR strategy score | .0107353 | .0110568 | 0.97 | 0.334 | -.0112377 | .0327084 |
| Size | 3.98e-11 | 3.19e-11 | 1.25 | 0.215 | -2.35e-11 | 1.03e-10 |
| Beta | -.5797774 | .3691615 | -1.57 | 0.120 | -1.313408 | .1538534 |
| Returns on assets | -2.52318 | 3.240387 | -0.78 | 0.438 | -8.962768 | 3.916408 |
| Total debt | -1.68e-10 | 8.03e-11 | -2.10** | 0.039** | -3.28e-10 | -8.80e-12 |
| Debt to equity ratio | -.1095664 | .8277625 | -0.13 | 0.895 | -1.75457 | 1.535438 |
| Earnings per share | .1218814 | .2136265 | 0.57 | 0.570 | -.3026564 | .5464191 |
| Volume | 4.94e-10 | 2.23e-09 | 0.22 | 0.825 | | 4.93e-09 |
| Constant | 4.635869 | .7801954 | 5.94*** | 0.000*** | 3.085395 | 6.186344 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01

**Table O. Regression model: Governance score and Total number of negative stock price jumps by countries**

| Number of negative stock price jumps | Coefficient | Std. err. | t | P>|t| | [95% Conf. Interval] | |
|---|---|---|---|---|---|---|
| *SWEDEN* | | | | | | |
| Management score | -.0037546 | .0045093 | -0.83 | 0.406 | -.0126248 | .0051157 |
| Shareholders score | .0023702 | .004352 | 0.54 | 0.586 | -.0061907 | .010931 |
| CSR strategy score | .0063146 | .0050961 | 1.24 | 0.216 | -.0037098 | .0163391 |
| Size | -1.82e-11 | 2.05e-11 | -0.89 | 0.373 | -5.85e-11 | 2.20e-11 |
| Beta | .1736291 | .3833072 | 0.45 | 0.651 | -.5803714 | .9276295 |
| Returns on assets | -3.433914 | 3.629558 | -0.95 | 0.345 | -10.57359 | 3.70576 |
| Total debt | -6.69e-12 | 5.11e-11 | -0.13 | 0.896 | -1.07e-10 | 9.38e-11 |
| Debt to equity ratio | .0254553 | .0488708 | 0.52 | 0.603 | -.0706781 | .1215887 |
| Earnings per share | -.0011321 | .007427 | -0.15 | 0.879 | -.0157417 | .0134774 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Volume* | -1.47e-10 | 1.24e-10 | -1.19 | 0.235 | -3.91e-10 | 9.63e-11 |
| *Constant* | 6.763588 | .6647052 | 10.18*** | 0.000*** | 5.456052 | 8.071124 |

|  | *FINLAND* | | | | | |
|---|---|---|---|---|---|---|
| *Management score* | .0062834 | .0053493 | 1.17 | 0.241 | -.004257 | .0168238 |
| *Shareholders score* | -.0052194 | .0054105 | -0.96 | 0.336 | -.0158805 | .0054416 |
| *CSR strategy score* | -.0060973 | .0056657 | -1.08 | 0.283 | -.0172611 | .0050664 |
| *Size* | 3.39e-11 | 2.84e-11 | 1.20 | 0.233 | -2.20e-11 | 8.99e-11 |
| *Beta* | .4339253 | .3610365 | 1.20 | 0.231 | -.2774693 | 1.14532 |
| *Returns on assets* | -1.426353 | 3.17063 | -0.45 | 0.653 | -7.673837 | 4.821131 |
| *Total debt* | -7.00e-11 | 9.24e-11 | -0.76 | 0.450 | -2.52e-10 | 1.12e-10 |
| *Debt to equity ratio* | -.3271382 | .5532532 | -0.59 | 0.555 | -1.417281 | .7630046 |
| *Earnings per share* | -.2701177 | .1491825 | -1.81* | 0.072* | -.5640703 | .023835 |
| *Volume* | -2.33e-10 | 1.44e-10 | -1.62 | 0.106 | -5.16e-10 | 5.02e-11 |
| *Constant* | 6.889516 | .7460986 | 9.23*** | 0.000*** | 5.419386 | 8.359646 |

|  | *DENMARK* | | | | | |
|---|---|---|---|---|---|---|
| *Management score* | -.0007056 | .0082285 | -0.09 | 0.932 | -.0169626 | .0155514 |
| *Shareholders score* | .0119161 | .0099914 | 1.19 | 0.235 | -.0078238 | .031656 |
| *CSR strategy score* | .0040477 | .009804 | 0.41 | 0.680 | -.0153221 | .0234175 |
| *Size* | 5.89e-13 | 1.88e-11 | 0.03 | 0.975 | -3.66e-11 | 3.78e-11 |
| *Beta* | -.7020689 | .658411 | -1.07 | 0.288 | -2.002887 | .5987496 |
| *Returns on assets* | -.5649392 | 2.535962 | -0.22 | 0.824 | -5.575223 | 4.445345 |
| *Total debt* | 5.55e-12 | 8.05e-11 | 0.07 | 0.945 | -1.54e-10 | 1.65e-10 |
| *Debt to equity ratio* | -.0323225 | .4380389 | -0.07 | 0.941 | -.8977532 | .8331082 |
| *Earnings per share* | .014393 | .0092724 | 1.55 | 0.123 | -.0039263 | .0327124 |
| *Volume* | 1.15e-09 | 1.70e-09 | 0.68 | 0.499 | -2.20e-09 | 4.51e-09 |
| *Constant* | 7.040567 | 1.148623 | 6.13*** | 0.000*** | 4.771239 | 9.309895 |

|  | *NORWAY* | | | | | |
|---|---|---|---|---|---|---|
| *Management score* | -.0295621 | .0099423 | -2.97*** | 0.004*** | -.0493203 | -.0098039 |
| *Shareholders score* | .0006937 | .0093311 | 0.07 | 0.941 | -.0178499 | .0192372 |
| *CSR strategy score* | .0245592 | .010372 | 2.37** | 0.020** | .003947 | .0451714 |
| *Size* | -5.48e-11 | 2.99e-11 | -1.83* | 0.070* | -1.14e-10 | 4.59e-12 |
| *Beta* | .318855 | .3462984 | 0.92 | 0.360 | -.3693403 | 1.00705 |
| *Returns on assets* | 7.261572 | 3.039702 | 2.39** | 0.019** | 1.220803 | 13.30234 |
| *Total debt* | 1.21e-10 | 7.53e-11 | 1.61 | 0.111 | -2.85e-11 | 2.71e-10 |

| | | | | | | |
|---|---|---|---|---|---|---|
| *Debt to equity ratio* | -1.383902 | .7764971 | -1.78* | 0.078* | -2.927027 | .159223 |
| *Earnings per share* | -.4651071 | .2003961 | -2.32** | 0.023** | -.8633522 | -.0668621 |
| *Volume* | -1.13e-09 | 2.09e-09 | -0.54 | 0.592 | -5.29e-09 | 3.04e-09 |
| *Constant* | 7.981966 | .731876 | 10.91*** | 0.000*** | 6.527516 | 9.436415 |

Note: *= p<0.10, **= p<0.05, ***=p<0,01