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Bachelor Thesis (Economics & Business Economics)

The impact of Environmental, Social, Governance (ESG)
reporting on firm value for the STOXX Europe 600

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The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Abstract

In this paper we were inspired by the chronological change of the literature about the relationship between ESG and firm value. While studies have focused on the FTSE 350 and the S&P 500, this thesis focussed on the STOXX Europe 600. This paper also investigates the relationship between size and ESG. This led to the main research question: 'What is the impact of Environmental, Social, Governance (ESG) reporting on firm value within the STOXX Europe 600?'. To try and answer this research question, this thesis uses the Ordinary Least Squares (OLS) method to study the relationship between size and ESG scores, but also the relationship between ESG scores and firm value. This thesis found that size has a significant association with the ESG score, but there might be many more variables to be accounted for. Next to that, this thesis also found that none of scores are significant for firm value.

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1. Introduction

1.1 Background

Plenty of issues are discussed in the public eye whether that be about the climate crisis, hierarchical problems in companies or big accounting scandals. They all can be mitigated by reporting more concisely and transparently towards the stakeholders. As a result, the influence of Environmental, Social and Governance (ESG) matters have gained a lot of attention during the past years relating to financial returns and firm value (Chen & Xie, 2022).

Besides, the environmental aspect has been a heated debate around the world in the public domain for years when it comes to regulation and competitiveness (Porter & Linde, 1995). The European Union (EU) implied specific rules for big companies to oblige, also known as the Non-Financial Reporting Directive (NFRD). NFRD resulted in more ESG data reported by companies that had more than 500 employees and was an attempt to realize the ESG goals of the EU (Fiechter, Hitz & Lehmann, 2022). To reach the goals of the EU, the Corporate Sustainability Reporting Directive (CSRD) was introduced in 2024 to add even more obligations for companies regarding ESG data. Also, it gave the EU more space to develop standard frameworks. Looking at all these obligations, the question arises whether ESG would harm the value of the European firms.

1.2 Research Question

This bachelor thesis will investigate the relationship between ESG disclosure level and the firm value within the STOXX Europe 600 (STOXX 600) firms for the period 2017 to 2022. Over the past decade, the increase of focus on sustainability has incentivised firms' disclosure of information regarding their Environmental, Social and Governance (ESG) practices (Gong, Koh, Li & Zhang, 2018). Firms can differentiate themselves if they are ahead of the competition and create a competitive advantage (Dkhili, 2023). It is believed that ESG is what stakeholders want, because it gives more transparency (Fernandez-Feijoo, Romero & Ruiz, 2014), but the question arises if this translates into a higher firm value. Therefore, the research question which this thesis tries to answer is:

What is the impact of Environmental, Social, Governance (ESG) reporting on firm value within the STOXX Europe 600?

Several recent studies have found a positive relationship between ESG disclosure level and firm value, but not solely for the European market (Gong, Koh, Li & Zhang, 2018). Thus, I argue that the value of firms within the STOXX 600 increases when there is more ESG disclosure done by them. Trying to further strengthen the literature about ESG and firm value and providing more clearance of the European market.

1.3 Scientific relevance

The goal of this thesis is to contribute to the existing literature about ESG. This thesis presents, as to my knowledge, the first exploration of the STOXX 600 with regard to ESG scores and firm value. Therefore, this thesis extends the work of existing literature which investigated the S&P 500 (Kristjanpoller, Minutolo & Stakeley, 2019). and FTSE 350 (Gong, Koh, Li & Zhang, 2018) about ESG and firm value. Filling the void about the STOXX 600 makes the literature more complete and gives a better understanding of the European markets.

Furthermore, this thesis broadens the literature when it comes to the importance of size and ESG scores. Throughout the existing literature, e.g. Fatemi, Glaum and Kaiser (2018), Gillan, Koch and Starks (2021), Gong, Koh, Li and Zhang (2018), the focus lies on whether ESG matters increase or decrease firm value but not if the size of a company is significant for its ESG scores. Hence, I aimed in filling this gap by exploring and trying to identify a contemporary relationship between the size of a company and ESG scores. This can inform fellow future researchers about this topic and adjust their models regarding ESG by considering extra variables and also review their samples concerning the size of companies.

1.4 Social relevance

The goal of this thesis is also to inform the society about ESG reporting effects. For European companies it might give a better understanding of how they should handle ESG matters and if they should invest so much time and effort into ESG. For example, if they should focus more deeply on the governance part rather than the environmental part (Fatemi, Glaum & Kaiser, 2018). However, it might also be that companies should only acknowledge the importance of the social part (Qiu, Shaukat & Tharyan, 2016).

Furthermore, other stakeholders such as customers, employees, communities and governments also gain more insight into the matter of ESG reporting which stems from better stakeholder engagement (Cheng, Ioannou & Serafeim, 2014). All the stakeholders can see how important the ESG matters are for their respective companies and can make better informed decisions about the European companies. Specifically for worldwide investors, the insights of ESG reporting of the STOXX 600 can alter their investments (Tang & Zhang, 2020).

1.5 Structure

In the remainder of the paper the structure is as follows. Chapter 2 summarizes the prior literature related to ESG which is the basis for developing the hypotheses. Afterwards, chapter 3 discusses the methodology of this research which explains which sample was used, which research design has been applied and the variables what lead to the separate models for the respective hypothesis. Subsequently, chapter 4 discusses the results and the tables produced for testing our hypothesis. Finally, chapter 5 discusses the conclusion, the limitations and focusses on recommendations for future research.

2. Theoretical Framework

2.1 Literature review

The question about the relationship between Environmental, Social and Governance (ESG) factors with a firm's financial performance and its value has been the key topic for several decades and is now more of an open debate than ever when looking at the literature. Coming from the neoclassical theory, the understanding was that this relationship between ESG and firm performance was negative (Vance, 1975). Vance (1975) also found that if a company gets more social responsibility, the stock market value of the company decreases. But he did mention that companies might have more reasons to be socially responsible next to their stock market value.

After several years, also Wright and Ferris (1997) found a negative relationship between ESG factors and firm performance. Although they did not solely test ESG factors, they focussed on divestments of business units. In these divestments there were also environmental aspects, social aspects, and governance aspects. Wright and Ferris (1997) note that these forces are not easily documented. Thankfully, Friedman (2007) gives a better understanding of the negative relationship between ESG factors and firm performance by claiming that firms focus on maximizing their owner's profit, because this is the only social responsibility they have. The fundamental assumption of Friedman (2007) was that the benefits derived from ESG activities do not outweigh their costs.

Likewise, Friedman (2007) also mentioned that the firm is an agent serving the interests of the stakeholders. He believes that businesses are incredibly short sighted, because of this. Additionally, Friedman (2007) believes that in an ideal free market grounded in private property rights, individuals cannot coerce one another concerning the social factors of ESG. Therefore, there are no social responsibilities or social values other than the shared values and responsibilities of individuals.

Some papers of a decade later continued in finding a negative relationship between ESG and firm value (Fisher-Vanden & Thorburn, 2011; Lyon, Lu, Shi, & Yin, 2013). Fischer-Vanden and Thorburn (2011) found this relationship by looking at firms who voluntarily set a goal of reducing greenhouse gas emissions and join a program which develops long-term strategies to reduce the impact of the firm on the climate. There were significant losses in the firm value after announcing these decisions.

Importantly, these results show that voluntary environmental initiatives hurt the value of a firm and that firms do not internalize the social costs of climate change. This all comes back to the argument of Friedman (2007) about that the benefits of ESG do not outweigh the costs.

Additionally, Lyon, Lu, Shi, and Yin (2013) look at the relationship between environmental and social performance at firm value for firms in China. Lyon et al. (2013) believe that China is an interesting country since it combines elements of a transition economy and a market-based economy. They find that firms with a strong relationship with the governance experienced non-positive effects at their firm value after winning the Green Company Awards by taking environmental and social investments.

On the contrary, Lyon et al. (2013) also find that privately-owned firms and firms in low-pollution industries have a bigger likelihood to suffer from negative market reactions regarding Green Company Awards. These firms typically attract less public attention, fewer enforcement supervision and might have minimal access to subsidized capital to invest in socially friendly activities. Therefore, such activities may cause greater conflicts with the shareholders about the social responsibility of the firm to maximize profits. However, this negative pattern of ESG and firm value has been broken in the more recent papers. Gong, Koh, Li, and Zhang (2018) report a positive relationship between ESG and firm value. Also Kristjanpoller, Minutolo and Stakeley (2019) find a positive relationship between ESG and firm value.

Both have studied the relationship between ESG and firm value. While Gong et al. (2018) focus on a large cross-sectional dataset comprising of FTSE 350 listed firms, Kristjanpoller et al. (2019) focus on what the effect is of ESG at firm performance for the S&P 500 index. Gong et al. (2018) found a positive relationship between ESG disclosure and firm value. This relationship was supported by the different measures of ESG disclosure, such as environmental and social disclosure scores. Also, their findings suggest that more ESG disclosure can enhance firm value for the FTSE 350 firms through transparency and accountability improvements.

Gong et al. (2018) have five arguments that support their view and findings. First, ESG practice provides additional information about a company. Also, the enhancement of internal management practices can build stronger relationships with

various stakeholders engaged in business with their companies because of ESG disclosure. Additionally, the improved availability of ESG information is a step in the right direction for reducing asymmetric information between firms and stakeholders. Therefore, it leads to more transparency and better insights into ESG matters of the firms. Finally, ESG disclosure also reduces the agency costs because stakeholders are being encouraged to engage and transparency is increasing.

Although their research was focussed on the London Stock Exchange, this positive relationship between ESG disclosure and firm value has also been found by Kristjanpoller et al. (2019) for the 500 leading publicly traded companies in the United States of America, also known as the S&P 500. Kristjanpoller et al. (2019) found several variables that had a positive relationship on firm value, measured as Tobin's Q. Variables such as return on assets, ESG and debt to assets were significant in this study on Tobin's Q. Furthermore, the number of employees and indebtedness also do have a significant positive effect on Tobin's Q. So, in general Kristjanpoller et al. (2019) found that the more profitable a firm is, the higher the ESG score; the more employees work in that firm and the higher the indebtedness, the higher Tobin's Q is. Additionally, it is important to remember that the ESG score does not directly influence the relationship, but it serves as a proxy for stakeholder communication.

Despite the difference in the sample, one being from the United States and the other from the United Kingdom, Gong et al. (2018) and Kristjanpoller et al. (2019) found a significant positive relationship between ESG factors and firm performance. Both studies have been using a similar research design such as taking Tobin's Q as their dependent variable in their models.

According to Qiu, Shaukat and Tharyan (2016) only the social part of ESG is what matters to investors, as these may help firms gain real economic benefits. Another reason they give is that social disclosures might be an attempt from the companies to gain the approval of several powerful political and social stakeholders. These arguments were seen indirectly in the paper of Friedman (2007), but Qiu et al. (2016) found a positive relationship between the social factors and firm performance.

Thus, Qiu et al. (2016) only agrees with Gong et al. (2018) and Kristjanpoller et al. (2019) about the social element in the positive relationship between ESG and firm value. At the same time they might also partially agree with Fischer-Vanden and

Thorburn (2011), Friedman (2007), Lyon et al. (2013), and Wright and Ferris (1997) that the environmental factors are negatively correlated with firm value, since Qiu et al. (2016) did not find a link between environmental scores and firm value. However, Qiu et al. (2016) do mention that it is the environmental news which influences the firm value. Despite these results, they also found that disclosure of environmental and social scores have an impact on the long run implied growth rates of a firm, which indicate that such disclosures can be viewed as a part of a firm's overall competitive strategy.

On the contrary, Fatemi, Glaum and Kaiser (2018) found that ESG disclosure decreases firm value. This is line with Fischer-Vanden and Thorburn (2011), Friedman (2007), Lyon et al. (2013), and Wright and Ferris (1997). Also, they found that ESG strengths increase firm value, but ESG concerns decrease it. They go further into this relationship by interacting disclosure with ESG strengths or weaknesses. In situations where a company exhibits strengths in ESG, increased disclosure in these areas weakens the positive impact on valuation associated with these strengths. Fatemi et al. (2018) give one potential explanation for this discovery by mentioning that markets might perceive heightened disclosure as the company's effort to rationalize excessive investment in ESG activities.

Similarly, the opposite is true, disclosure mitigates the negative impact on valuation associated with ESG concerns. One reason might be, according to Fatemi et al. (2018), that disclosures help firms in justifying their actions by clarifying the appropriateness of their operations and ESG policies to investors. Alternatively, firms may persuade investors that they have made trustworthy investments to reform their operations, thereby overcoming ESG shortcomings. Finally, they show that governance-related concerns have steeper valuation discounts than environmental or social concerns. While Qiu et al. (2016) found that it is only the social part what matters to investors, Fatemi et al. (2018) found that the effects of governance-related disclosure are much stronger than the social or environmental ones. Fatemi et al. (2018) believe that the effects are related to the opacity of it. Governance-related are mostly regulated or mandated which makes assessing their veracity for investors relatively easy and trustworthy.

Furthermore, Aouadi and Marsat (2018) focus on what the relationship is of ESG controversies with firm value. They define ESG controversies as ESG news stories

which places a firm in the spotlight and grabs the attention of investors. Also Qiu et al. (2016) mention that ESG news influence firm value, but they only looked briefly at the environmental news. Surprisingly, the study of Aouadi & Marsat (2018) shows that the interaction effect of ESG controversies and firm value have a significant positive effect for high-attention firms. Yet, ESG controversies solely do not have a direct effect on the value of the firm since the effect they found was spurious. They also find that the impact of ESG controversies on firm value appears to be mostly affected by the changes in search costs and information asymmetry. Information asymmetry was a phenomenon what Gong et al. (2018) mentioned when finding a positive relationship between ESG and firm value. Additionally, they find that firm size is negatively related to Tobin's Q, while Kristjanpoller et al. (2019) believe that this relationship is positive.

Also, Fujii, Managi, Nozawa, Xie and Yagi (2019) have done research concerning ESG. They focussed on the relationship between corporate efficiency and corporate transparency regarding ESG disclosure to discover whether firms concerned about ESG issues can also be profitable and efficient. Even though Fujii et al. (2019) had several conclusions like finding a nonnegative relationship between ESG activities and financial performance, there is no doubt that there is a positive association between corporate efficiency and ESG information disclosures which supports the findings of Gong et al. (2018) and Kristjanpoller et al. (2019).

However, Fujii et al. (2019) also mentioned that firms need to be more effective in their execution when it comes to climate change-related policies so that the benefits outweigh the costs what Friedman (2007) saw as a requirement for ESG being positively related to firm value. Also, Fujii et al. (2019) believe that governance is the most important for corporate companies, therefore disclosing more governance information would enhance the market competitiveness. Finally, they also mention that budget constraints might be a reason of lower expenditures on ESG activities for medium-sized firms. Big firms have more resources to spend and have an advantage compared to the medium-sized firms. Government or non-governmental organizations can contribute to enhancing associations between firms for confronting similar ESG challenges.

2.2 Hypothesis Development

Gong et al. (2018) mention that multiple studies based on the stakeholder theory describe that mutual trust and cooperation with stakeholders reduces implicit and explicit costs for negotiating or contracting. So, being more transparent is highly valued by stakeholders. Also, this is shown in their results with the positive relationship between ESG disclosure and firm value for the S&P 500 firms, because it increases transparency. The importance of transparency was also discussed by Fujii et al. (2019) whereby disclosing more about governance would lead to better results.

Moreover, Fujii et al. (2019) mentioned that bigger firms have more resources for disclosures and that medium-sized firms have budget constraints. Also Kristjanpoller et al. (2019) take the stakeholder theory into consideration and mention the importance of transparency in their basis and use these for formulating their hypothesis. However, they also mentioned that there would be a difference in the relationship because of the relative size of the firms, therefore they looked at for example the number of employees, revenues and cash. This brings me to my first hypothesis:

H1: Firms in the STOXX Europe 600 with a bigger size in terms of revenue have a higher ESG-score to comply with stakeholders

Throughout the last decades there have been different findings when it comes to the relationship between ESG and firm value. Some researches like Fatemi et al. (2018), Fischer-Vanden and Thorburn (2011), Friedman (2007), Lyon et al. (2013), Vance (1975), and Wright and Ferris (1997) found a negative relationship regarding ESG and firm value. While others like Fujii et al. (2019), Gong et al. (2018), and Kristjanpoller et al. (2019) find a positive relationship regarding ESG and firm value. Next to these, there were researches like Fatemi et al. (2018) and Qiu et al. (2016) who found that some factors like social or governance were more important aspects of ESG related to firm value.

Fujii et al. (2019) build upon Gong et al. (2018) and Kristjanpoller et al. (2019). Fujii et al. (2019) come to the conclusion that the relationship between corporate efficiency regarding ESG disclosure and corporate sustainability is positive. Furthermore, Aouadi & Marsat (2018) show that ESG controversies are associated with greater firm value. Additionally, Gong et al. (2018) show that there is a positive

association between ESG-scores and firm value. While Kristjanpoller et al. (2019) show a positive association between ESG-scores and firm performance.

All the authors use Tobin's Q as the variable to measure firm value, except Aouadi & Marsat (2018) who use return on assets. The conclusion of all these papers comes down to that ESG-scores influences Tobin's Q and that this influence is positive. As the recent papers lean towards a positive relationship between ESG and firm value instead of a negative relationship, my second hypothesis is as follows:

H2: ESG scores have a positive and significant effect on firm value of the firms in the STOXX Europe 600

3. Methodology

3.1 Sample

The relationship of ESG and firm value as well as the relationship between size and ESG will specifically be studied on the firms in the STOXX 600. This is an index which contains the 600 largest firms of Europe and by looking at more than 100 European firms, the results can be generalized. Kristjanpoller et al. (2019) show that ESG has a strong impact on Tobin's Q for big companies in the S&P 500 sample. The S&P 500 is also an index, but it contains the 500 largest companies from the United States of America. I will be looking at a different continental index but also a larger index. So, it will be interesting to see if first of all these results are identical for a bigger and different index and secondly if our results are identical for the European markets.

3.2 Research design

In this research, the Ordinary Least Squares (OLS) method is used to study the relationship between size and ESG, but also for the relationship between ESG and firm value. This means that a linear regression is done with a dependent and independent variable and several control variables. Besides, the use of fixed effects and an error term is also included in our regression.

Doing this for the period between 2017-2022 will be most reliable because before 2017 many companies have missing data when it comes to the ESG data. This applies also for the year 2023 but the reason for this year would be that not everything has been published or processed yet in the databases regarding ESG data. In 2014 the Non-Financial Reporting Directive became active which resulted in more ESG information (Chiaramonte, Dreassi, Girardone & Piserà, 2022). Nevertheless, it took some years before companies really published this information and for databases to take it into their data. Therefore, the time span for this research is 2017-2022.

3.3 Regression variables and empirical models

To study the relationship between ESG and size, but also ESG and firm value for the firms in the STOXX 600, the database LSEG Workspace is used to obtain data. This database was previously known as Eikon or Datastream. The main variable of interest is the comprehensive ESG score provided by LSEG Workspace. The database also offers the individual environmental, social and governance scores. Additionally,

LSEG Workspace also provides accounting data such as revenues, cash, or total debts.

Next to the comprehensive ESG-score, it is also relevant to look into the different dimensions of the ESG-score. We saw that Fatemi et al. (2018) found that governance was the most impactful on firm value, while Qui et al (2016) found that this was the social aspect. So, using the E score, S score and G score separately will give a better understanding of the relationship of ESG on firm value, and we might find a positive relationship like Gong et al. (2018). Next to these scores I also need a variable measuring the firm value and firm performance. Following Aouadi & Marsat (2018), Fujii et al. (2019), Gong et al. (2018), Kristjanpoller et al. (2019), I choose to use the Tobin's Q for measuring firm value, and Return On Assets (ROA) as a measure for firm performance as a control variable. All these authors have a similar approach, and this will give insights into the effect of ESG on firm value.

All the authors we mentioned believed there might be a bias if not other variables are taken into account next to ESG. Therefore, next to ESG-score, the ESG controversy score is taken into account. Furthermore, we take the same model as the ESG-score but instead we use the individual scores. Following the literature, e.g. Gong et al. (2018) and Kristjanpoller et al. (2019), I am also taking accounting variables into account. The accounting variables which are included as explanatory variables are ROA, Property, Plant, and Equipment (PPE), cash, leverage, number of employees and Market To Book value (MBTV). ROA will also be an explanatory variable when putting Tobin's Q as the dependent variable. Finally, the size will also be included as an explanatory variable.

The ESG-score is a comprehensive score which means that it is a combined score. The E-score, S-score and G-score are individual scores. Furthermore, we have seen with Aouadi & Marsat (2018) that the interaction effect of ESG controversies and firm value have a significant positive effect for high-attention firms. Therefore, it is important to take the controversy score into account when putting Tobin's Q as the dependent variable.

To give more meaning to the numbers, the variables PPE and cash will be divided by total assets. Leverage is calculated by dividing total debts by total assets. Furthermore, the size is in terms of total revenues but the total revenues are

transformed into a logarithmic form to reduce the skewness in the data in all of the models. So, the variable size is measured as the logarithm of the total revenues. Next to that, the return on assets is calculated by dividing the net income by the total assets. Moreover, we add MBTV as another control variable which is defined as the market value of the common equity divided by the balance sheet value of the common equity in the company. The number of employees shows the total number of employees per year. Lastly, Tobin's Q is defined as the total market value divided by total assets.

Concerning the first hypothesis, which is about whether bigger sized firms in term of revenues do have a higher ESG grade, the following full model will be used to test the first hypothesis:

$$\begin{aligned} ESG - score = & \beta_0 + \beta_1 Size_{i,t} + \beta_2 Number\ of\ Employees_{i,t} + \beta_3 PPE_{i,t} + \beta_4 Cash_{i,t} \\ & + \beta_5 ESG\ Controversy\ Score_{i,t} + \beta_6 MTBV_{i,t} + YearFixedEffect_t \\ & + IndustryFixedEffect_t + CountryFixedEffect_t + \varepsilon_{i,t} \end{aligned}$$

Similarly for the second hypothesis, which is about whether ESG scores have a positive and significant effect on firm value, the following full models will be used to test the second hypothesis:

$$\begin{aligned} Tobin's\ Q = & \beta_0 + \beta_1 ESG_{i,t} + \beta_2 ESG\ Controversy\ Score_{i,t} + \beta_3 ROA_{i,t} + \beta_4 Size_{i,t} \\ & + \beta_5 PPE_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 Cash_{i,t} + YearFixedEffect_t \\ & + IndustryFixedEffect_t + CountryFixedEffect_t + \varepsilon_{i,t} \end{aligned}$$

$$\begin{aligned} Tobin's\ Q = & \beta_0 + \beta_1 E_{i,t} + \beta_2 S_{i,t} + \beta_3 G_{i,t} + \beta_4 ESG\ Controversy\ Score_{i,t} + \beta_5 ROA_{i,t} \\ & + \beta_6 Size_{i,t} + \beta_7 PPE_{i,t} + \beta_8 Leverage_{i,t} + \beta_9 Cash_{i,t} + YearFixedEffect_t \\ & + IndustryFixedEffect_t + CountryFixedEffect_t + \varepsilon_{i,t} \end{aligned}$$

To clarify, the 'i,t' in the models stand for 'firm i at time t'. All the variables were defined in this section but to be able to test this hypothesis properly, certain effects are added to the model. These effects are the year fixed effects, industry fixed effects and the country fixed effects. By doing this, the effect which is associated with the country, industry and year in which firms operate will be isolated and taken out of the other variables. So, this will remove some of the omitted variables bias from the models. The error term represents the margin of error in the models.

4. Results

4.1 Descriptive statistics

All the values of the variables used are sourced from the LSEG Workspace database. The database is updated regularly to provide the most current information to its users. Nonetheless, some variables such as ESG score, return on assets or cash were not recorded in the database for some companies. In the end, the total amount of observations of 3462 was reduced to 2692, a reduction of 770 observations.

Table 4.1 illustrates the number of observations, minimum, maximum, mean and the standard deviation of all the variables used. First of all, the ESG score is the combined score and with an average mean of 63.359. The mean of the E and the G score of 66.111 and 65.124 are close with the mean of the ESG score, but the S score has a higher mean of 71.464. Overall, the S score is often higher than the other separate scores. Notable is that this is not the case for the standard deviation, which shows how dispersed the data is compared to the mean. For the E score, the data is more dispersed than the other scores. As for the ESG controversy score, it is eye catching that the maximum score is 100, while this is not the case for the other scores. Furthermore, it has a mean of 83.530 meaning that a lot of observations have a high ESG controversy score and with a standard deviation of 29.056. The data is even more dispersed for the controversy score than for the E score.

When looking at the accounting data which starts from the sixth row, the size is measured in the logarithmic form of revenues to prevent skewness in the data. Size has a positive mean of 15.443 and a slight standard deviation of 1.539. As for the Market To Book Value (MTBV) the minimum has a negative value which means that there are observations who have a negative market value or book value. However, the mean is 1.695 with a standard deviation of 103.749 indicating that there are many observations with difference in MTBV when it comes to a positive or negative value. Furthermore, the return on assets has a positive mean of 6.776, but there is an enormous difference between the minimum and maximum of -63.720 and 253.090. Overall, the sample makes on average a positive return of 6.776.

Tobin's Q is calculated as the total market value divided by the total assets. All the observations have a positive Tobin's Q, since the minimum is 3.246. Indicating

that the observations have a higher market value than their total assets. Overall, the sample has on average a market value of 1460.421. Similarly, cash and PPE do not have any negative values, but these variables were scaled by the total assets. On average, there is only 0.092 cash per asset. In contrast with PPE which is higher with on average 0.238 PPE per asset. Additionally, leverage is the total debt divided by total assets with a mean of 0.255 and a standard deviation of 0.159. On average, the sample has taken 0.255 debt per total asset. Finally, the number of employees shows that on average 43429 people work for a company in the sample.

Table 4.1: Descriptive statistics of the regression variables

Variables	Number of Observations	Minimum	Maximum	Mean	Standard Deviation
ESG score	2692	7.710	95.160	63.359	15.326
E score	2692	0	99.140	66.111	22.331
S score	2692	0.250	98.140	71.464	18.158
G score	2692	5.370	98.560	65.124	19.418
ESG Controversy score	2692	0.740	100	83.530	29.056
Size	2692	8.537	19.613	15.512	1.537
Market to Book Value	2692	-5143.32	862.670	1.695	103.749
Return on Assets	2692	-63.720	253.090	6.776	12.202
Tobin's Q	2692	3.246	72226.250	1460.421	2970.580
Cash	2692	0	0.700	0.092	0.097
PPE	2692	0	0.993	0.238	0.242
Leverage	2692	0	0.927	0.255	0.159
Number of employees	2692	0	600278	43528.620	72161.980
Year	2692	2017	2022	2019.509	1.690
Country	2692	1	17	10.171	5.669
Industry	2692	1	11	5.557	2.723

Note: This table shows the summary statistics for all the variables which are used in the regression models. Size is measured as the logarithm of revenues. Furthermore, the variables cash, PPE, leverage are scaled by total assets. The aforementioned variables and Tobin's Q are all in Euros. The variables year, country and industry are categorical variables which are included for the fixed effects.

After describing all the variables and getting a better understanding it is also important to get a better understanding of the correlation between the variables.

Table 4.2 shows the correlation between variables and when it is significant it means that the variables have a significant correlation with each other. This table helps to detect multicollinearity which occurs when two or more independent variables are highly correlated which makes it harder to interpret the coefficient. Moreover, it weakens the strength of the model. So, Table 4.2 provides a concise summary of the linear relationships between the variables which help to understand the strength and direction of the relationships.

Firstly, looking at the table column wise regarding the ESG combined score, Table 4.2 shows that all the variables except MTBV are significant at the significance levels of 1%, 5% and 10%. Furthermore, the variables cash, return on assets, MTBV and Tobin's Q are negatively correlated with the ESG combined score, while the other variables are positively correlated. Additionally, the E, S and G score are the most correlated to the ESG combined score.

Similarly for the E score, Table 4.2 shows that all the variables except MTBV are significant at the significance levels of 1%, 5% and 10%. Moreover, the variables ESG controversy score, cash, return on assets, MTBV and Tobin's Q are negatively correlated with the E score, while the other variables are positively correlated. Furthermore, the S score is the most correlated with the E score.

For the S score, Table 4.2 indicates that PPE is only significant at a significance level of 10%, while all the other variables except MTBV are significant at all the significance levels. Moreover, the variables G score, size, employees, PPE, and leverage are positively correlated with the S score, while the other variables are negatively correlated. Finally, size is the variable which is most correlated with the S score.

Regarding the G score, Table 4.2 shows that cash is only significant at a significance level of 10%, while all other variables except MTBV are significant at all significant levels. Furthermore, the variables size, employees and leverage are positively correlated with the G score, while the other variables are negatively correlated. Lastly, size is again the variable that is the most correlated with the G score.

Moving on to the ESG controversy score, Table 4.2 shows that PPE is only significant at a significance level of 10%, but also that leverage is only significant at

the significance levels of 5% and 10%. All the other variables except MTBV are significant at all the significance levels. Additionally, the variables size, employees, leverage, and Tobin's Q are negatively correlated with the ESG controversy score, while the other variables are positively correlated. Again, the most correlated variable is size.

Looking at size, Table 4.2 indicates that all the variables are significant at all significant levels except for leverage and MTBV. Additionally, employees are positively correlated with size, while the other variables are negatively correlated with size. In this case, the variable employees is the most correlated with size when looking at Column 6 in Table 4.2.

For the number of employees which are indicated as employees in Table 4.2, Table 4.2 shows that all the variables are significant at all significant levels except MBTV. Also, leverage is positively correlated with the number of employees, but the other variables are negatively correlated. Lastly, the variable return on assets is the most correlated with the number of employees.

Similarly, for cash all the variables except MTBV are significant at all significant levels. Furthermore, return on assets and MTBV are positively correlated with cash, but the other variables are negatively correlated. Now Tobin's Q is the variable that is the most correlated with cash. For PPE, Table 4.2 shows that all the variables are significant on all significant levels except return on assets and MTBV. Only leverage is positively correlated, while the others are negatively correlated, and leverage is the most correlated variable with PPE.

For return on assets, leverage and MTBV all the variables are significant at all significant levels. Additionally, MTBV and Tobin's Q are positively correlated with return on assets while leverage is negatively correlated. For leverage, MTBV and Tobin's Q are negatively correlated and for MTBV the Tobin's Q is positively correlated. Finally, for return on assets, leverage and MTBV the most correlated variable is Tobin's Q.

Table 4.2: Results of correlation between the regression variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ESG Combined score	1.000						
(2) E Score	0.595***	1.000					
(3) S Score	0.658***	0.637***	1.000				
(4) G Score	0.483***	0.264***	0.327***	1.000			
(5) ESG Controversy score	0.338***	-0.249***	-0.251***	-0.208***	1.000		
(6) Size	0.216***	0.514***	0.463***	0.310***	-0.473***	1.000	
(7) Employees	0.121***	0.351***	0.351***	0.160***	-0.316***	0.558***	1.000
(8) Cash	-0.053***	-0.187***	-0.084***	-0.036*	0.081***	-0.223***	-0.067***
(9) PPE	0.073***	0.119***	0.036*	-0.050***	0.037*	-0.160***	-0.160***
(10) Return on Assets	-0.060***	-0.126***	-0.137***	-0.072***	0.111***	-0.196***	-0.196***
(11) Leverage	0.107***	0.115***	0.143***	0.059***	-0.039**	-0.008	0.106***
(12) MTBV	-0.014	-0.019	-0.008	-0.009	-0.003	-0.005	-0.001
(13) Tobin's Q	-0.070***	-0.192***	-0.147***	-0.067***	0.137***	-0.274***	-0.113***
Variables	(8)	(9)	(10)	(11)	(12)	(13)	
(8) Cash	1.000						
(9) PPE	-0.144***	1.000					
(10) Return on Assets	0.185***	-0.001	1.000				
(11) Leverage	-0.153***	0.356***	-0.144***	1.000			
(12) MTBV	0.033	-0.022	0.069***	-0.057***	1.000		
(13) Tobin's Q	0.289***	-0.061***	0.829***	-0.118***	0.068***	1.000	

Note: This table shows the correlation between the regression variables; Standard errors are in parentheses;

* p<0.1, ** p<0.05, *** p<0.01.

4.2 Does the size of a firm matter for its ESG score?

As mentioned earlier in the methodology, the first hypothesis is that firms in the STOXX 600 with a bigger size in terms of revenue have a higher ESG score. When looking at Table 4.3, the variable size is measured as the logarithm of the total revenues. In Column 1 of Table 4.3 we see that size has a significant positive association with the ESG score at all significance levels as well as the constant. However, the constant cannot be interpreted since it is unrealistic that size will be 0.

The same conclusion can be drawn from Model 1.2, but now we do include year, country, and industry effects. We see an increase of the coefficient of size and a slight decrease of the constant. Indicating that size might have a bigger coefficient,

because there is omitted variable bias in Model 1.1. and 1.2 since there is only one variable. Therefore, in Model 1.3 and 1.4 we add extra variables. We see that the coefficient of size drastically increases from 2.433 to 5.503. Again, the fixed effects do have an impact on all the coefficients. For Model 1.3, all the coefficients except cash and MTBV are significant. Moreover, size, PPE and ESG controversy score have a positive association with Tobin's Q. When comparing Model 1.3 with 1.4, PPE seems not significant anymore. So, it seems that the fixed effects partially remove the omitted variables bias.

In Model 1.5 and 1.6, the variable number of employees is added to see if this variable brings changes to the size. For both, we see a slight decrease compared to Model 1.3 and 1.4. The coefficient of size in Model 1.6 is also in logarithmic form and can be interpreted as 'if size increases with 1%, keeping all the other variables constant, the ESG combined score increases with 0.053'. Furthermore, we see that the R-squared is the same for Model 1.4 and 1.6, indicating that the models explains roughly the same amount of variation of the sample. To conclude, out of Table 4.3 it seems that the zero hypothesis, size has no effect on the ESG score, cannot be rejected. The only conclusion we can take of this is that size has a significant positive association with the ESG score of the firms in the STOXX 600. We cannot say that it is a positive causal effect, because most likely the Zero Conditional Mean (ZCM) or conditional mean independence does not hold since there might be more omitted variable bias. There might be many more variables that are correlated with size which are not accounted for.

Table 4.3: Linear regression results for the relationship between size in terms of revenue and ESG score

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Model 1.1- Single	Model 1.2- Single	Model 1.3 – Full	Model 1.4 - Full	Model 1.5 – Full	Model 1.6 – Full
Size	2.157*** (0.401)	2.433*** (0.439)	5.172*** (0.401)	5.503*** (0.432)	4.958*** (0.465)	5.331*** (0.490)
PPE			8.845*** (2.387)	3.893 (3.798)	8.786*** (2.382)	3.889 (3.794)
Cash			5.733 (6.000)	4.237 (6.144)	5.342 (5.994)	4.102 (6.107)
ESG controversy score			0.303*** (0.013)	0.318*** (0.013)	0.305*** (0.013)	0.319*** (0.013)
MTBV			-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Number of Employees					0.000 (0.000)	0.000 (0.000)

Constant	29.897*** (6.358)	29.121*** (7.820)	-44.841*** (7.171)	-51.332*** (8.291)	-41.954*** (7.967)	-48.851*** (9.045)
Observations	2692	2692	2692	2692	2692	2692
R-squared	0.047	0.141	0.315	0.407	0.316	0.407
Year Fixed Effect	No	Yes	No	Yes	No	Yes
Country Fixed effect	No	Yes	No	Yes	No	Yes
Industry Fixed Effect	No	Yes	No	Yes	No	Yes

Note: This table, relevant for hypothesis 1, shows the regression results for the relationship between size in terms of revenue and ESG score. Size is measured as the logarithm of total revenues. Furthermore, the variables cash and PPE are scaled by the total assets. These aforementioned variables are in Euros. The variables year, country and industry are categorical variables which show the fixed effects. All the models are with clustered standard errors and there are 478 clusters; Standard errors are in parentheses; * p<0.1, ** p<0.05, *** p<0.01.

4.3 Does ESG have an influence on firm value?

As mentioned earlier in the methodology, the second hypothesis is about whether the firm value increases when the ESG score is higher. Therefore, Table 4.4 is conducted to see if the ESG combined score has a significant positive effect at firm value. In Table 4.5 we deepen further into the ESG score and check whether either of the individual scores have a significant effect on firm value.

Starting with Model 2.1, first of all the constant cannot be interpreted since it is unrealistic to assume that all the variables will be 0 or that the ESG combined score would be 0. Secondly, we see that the ESG combined score has a significant negative association with firm value at the confidence level of 10%, however we cannot reject the null hypothesis that ESG has no effect on firm value, because neither the ZCM nor conditional mean independence holds. The same conclusion can be taken about Model 2.2. The difference in Model 2.2 compared to Model 2.1 are the year, country, and industry effects, but only the constant does differ a lot while the coefficient of the ESG combined score shows a slight decrease.

In Model 2.3 and 2.4 all the variables are included to see if the ESG combined score gets more significant as a result of less omitted variable bias. For both we see that the coefficient of ESG becomes insignificant, but for Model 2.3 it has a positive association while for Model 2.4 this association is negative. The difference between these are again the fixed effects. Also, the accounting variables return on assets, PPE, cash, and size are significant. These results show that there is not enough evidence to reject the null hypothesis which states that ESG has no effect on firm

value. The only conclusion we can take is that ESG has a negative association on firm value.

Table 4.4: Linear regression results for the relationship between ESG combined score and firm value

Variables	(1)	(2)	(3)	(4)
	Model 2.1 – Single	Model 2.2 – single	Model 2.3 –Full	Model 2.4 –Full
ESG Combined Score	-13.743* (5.527)	-13.222* (5.450)	2.890 (3.611)	-0.816 (3.363)
ESG Controversy Score			-1.596 (2.063)	-0.065 (1.687)
Return on Assets			193.133*** (39.965)	191.685*** (41.045)
Size			-223.560*** (58.300)	-171.027*** (65.603)
PPE			-937.734*** (218.186)	-1225.917** (541.839)
Leverage			699.119* (422.465)	514.293 (503.780)
Cash			3481.453*** (1031.041)	3202.530** (1263.760)
Constant	2331.149*** (450.185)	1726.642*** (474.023)	3294.543*** (1054.889)	2454.040* (1285.069)
Observations	2692	2692	2692	2692
R-squared	0.005	0.100	0.719	0.732
Year Fixed Effect	No	Yes	No	Yes
Country Fixed effect	No	Yes	No	Yes
Industry Fixed Effect	No	Yes	No	Yes

Note: This table, relevant for hypothesis 2, shows the regression results for the relationship between ESG combined score and firm value. Size is the logarithmic form of the total revenues. Furthermore, the variables cash, PPE and leverage are scaled by the total assets. These aforementioned variables are all in Euros. The variables year, country and industry are categorical variables which show the fixed effects; The clustered standard errors are in parentheses and there are 478 clusters; * p<0.1, ** p<0.05, *** p<0.01.

On the one hand, the ESG combined score was insignificant, but this might be different for the individual scores. In Model 3.1 and 3.2 of Table 4.5, only the individual scores are included. The E score in both models has a significant negative association, but we cannot reject the null hypothesis that the E, S nor G score has no effect on firm value, because the conditional mean independence does not hold in these models. The constant cannot be interpreted, since it is unlikely that the scores would be 0. In Model 3.3 and 3.4, all the variables are included to mitigate the

omitted variable bias, but the coefficients of E, S and G scores become insignificant. Return on assets, size, PPE, and cash stay significant while size and cash become less significant. In the end, there is not enough evidence found that the individual scores have an effect on firm value.

Table 4.5: Linear regression results for the relationship between firm value and the E, S and G scores

Variables	(1)	(2)	(3)	(4)
	Model 3.1 – Single	Model 3.2- Single	Model 3.3- Full	Model 3.4 – Full
E score	-21.908*** (4.510)	-9.360** (4.059)	-5.606 (3.577)	-2.813 (2.979)
S score	-6.401 (17.497)	-19.852 (14.810)	6.134 (4.915)	-0.994 (4.138)
G score	-1.573 (9.256)	1.059 (9.785)	3.127 (3.388)	3.602 (2.884)
ESG Controversy Score			-0.431 (1.348)	-0.254 (1.248)
Return on Assets			193.338*** (39.926)	191.732*** (40.681)
Size			-210.031*** (56.107)	-163.207** (68.205)
PPE			-854.019*** (211.792)	-1172.453** (526.153)
Leverage			651.905 (437.880)	488.216 (499.113)
Cash			3367.132*** (1009.100)	3156.039** (1253.566)
Constant	3468.612*** (735.191)	2935.562*** (723.827)	2900.337*** (987.076)	2359.484* (1279.190)
Observations	2692	2692	2692	2692
R-squared	0.038	0.120	0.721	0.733
Year Fixed Effect	No	Yes	No	Yes
Country Fixed effect	No	Yes	No	Yes
Industry Fixed Effect	No	Yes	No	Yes

Note: This table, relevant for hypothesis 2, shows the regression results for the relationship between the E, S, and G scores and firm value. Size is measured as the logarithm of the total revenues. Furthermore, the variables cash, PPE and leverage are scaled by the total assets. These aforementioned variables are all in Euros. The variables year, country and industry are categorical variables which show the fixed effects; The clustered errors are in parentheses and there are 478 clusters; * p<0.1, ** p<0.05, *** p<0.01.

5. Conclusion

5.1 Conclusion and future research

In this paper we were inspired by the chronological change of the literature about the relationship between firm value and ESG. While studies have focused on the FTSE 350 (Gong et al., 2018), and the S&P 500 (Kristjanpoller et al., 2019), this thesis focussed on the STOXX Europe 600. Furthermore, we saw that the literature focussed on the relationship between ESG and firm value, but not on the relationship between size and ESG.

Therefore, we first examine this relationship following up with ESG and firm value. This led to the main research question ‘What is the impact of Environmental, Social, Governance (ESG) reporting on firm value within the Stoxx Europe 600?’. This thesis found that size has a significant association with the ESG score, but there might be many more variables to be accounted for. Therefore, it is not right to say that this effect is causal but only that there is a positive association. So, our first hypothesis gets confirmed that bigger sized firms indeed have a higher ESG score, but we do not know for certain if this effect is causal.

Next to that, this thesis also found that none of the scores have a significant effect. In contrast to Gong et al. (2018) who found a positive association between ESG scores and firm value just like Kristjanpoller et al. (2019) who found a positive association between ESG scores and firm performance, we found a negative association between ESG and firm value. There was not enough evidence to conclude that the ESG score were influential for the firm value as a causal relationship but only that ESG has a negative association. In contrast with our second hypothesis which was that ESG has a positive and significant effect on firm value.

As a whole, the research question gets partially answered with the insight of the significance of size relating to the ESG score. However, the relation with firm value has not been justified in this thesis. When bigger sized firms have higher ESG scores it is important to keep an eye on them so that the ESG scores do not get inflated. Clearly, there have been multiple limitations which might have impacted our results of the models. First of all, this thesis was constrained to the variables offered by the LSEG workspace. So, future research should use multiple databases which will increase the number of relevant variables. Furthermore, both models suffer from

omitted variable bias. Therefore, another recommendation for future research is to identify more variables which might be relevant to Tobin's Q and the ESG score. Talking to experts who judge the ESG score as well as the individual scores might give insights about unidentified variables which we as researchers might not have thought about and this might give a better understanding of these scores.

Also, there could be more focus on schools about ESG so that the society gives more value to these aspects resulting in awareness and valuation among stakeholders. Finally, for future research it is recommended that the relationship between size and ESG score should be further investigated in for example other indexes. This can also be expanded with looking at the individual scores to get a better understanding of the importance of environmental, social or governance matters.

6. References

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