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# **ESG performance and company financial performance**

**Moderated by board gender diversity and sensitive industries**

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## Abstract

The purpose of this paper is to measure the relation between firm's ESG performance and financial performance moderated by board gender diversity and sensitive industries. The sample contains 85 stock listed companies of three west-European stock indexes (AEX, BEL20 and DAX) from 2013 to 2020 (524 firm-year observations). The data is collected via the Revinitiv eikon database. The regression model does not find an effect of ESG performance on financial performance due to missing explanatory variables. The direct effect of ESG performance is found in the model with moderating variables. The results indicates that board gender diversity does not moderate the effect of ESG performance on financial performance. The results indicate that there is a moderating effect of sensitive industries to the effect of ESG performance. The effect is weaker for sensitive industries. Firms which operate in a sensitive industry are less stimulated to increase ESG performance because their ESG performance has less effect on their financial performance. This adds to the existing knowledge about ESG performance. It can contribute to policy makers that they have to stimulate firms in sensitive industries more to increase ESG performance. These firms are less stimulated due to a weaker effect on their financial performance.

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# 1 Introduction

Goal eight of the sustainable development goals is to achieve sustainable economic growth (United Nations, 2015). These goals have to be achieved to reduce climate change and global warming. This made the environmental, sociological and governance (ESG) performance increase importance. Companies should help to reach these goals by increasing their ESG performance. This benefits the society but can also benefit the companies to achieve more growth. This study focuses on the effect of ESG performance on company financial performance.

## 1.1 Research problem and motivation

ESG performance is an upcoming topic in the financial reporting environment. More companies focus on increasing ESG performance and customers seem to appreciate this. Multiple studies (Fatemi et al., 2018; Saygili et al., 2021; Yilmaz, 2021) have proven that financial performance is positively influenced by the ESG performance. This means that higher ESG performance leads to higher financial performance for companies. This effect could be influenced by different moderating independent variables. For example, The study of Fayemi et al. (2018) looks at the moderating role of disclosure.

Another trending topic is board diversity. The study of Harjoto et al. (2015) examines the impact of board diversity to Corporate Social Responsibility (CSR). They find that diversified boards are better able to satisfy a broader group of stakeholders. This indicates that there is an effect between ESG performance and board diversity. However, this study used a sample from 1999 to 2011. The effect could be changed because these two topics increased in importance over the last 10 years. The study also did not link this with company financial performance, which is the main driver of most companies (CFI education, n.d.).

The variable '*board diversity*' has been studied as a moderating variable for the effect of ESG performance on company performance (Kahloul et al., 2022; Nekhili et al., 2021). But these studies focus on non-European countries and the datasets could be outdated. Board diversity could be a moderating factor because stakeholders appreciate when companies benefit the society with better ESG performance and that the board composition is a fair reflection of the

stakeholder group. The study of Vafaei et al. (2015) suggest a positive influence of board diversity on company financial performance. However, this study does not take ESG performance into account and the sample period is from 2005-2011. The results could be different when it is conducted now because the topics have increased in importance.

Customers could be more attracted to the company because they see that the company ESG performance is better than its competitors and the board is more evenly distributed. This leads to more revenue and profit. Also, employees could be more motivated to work in companies when they feel that the company adds to society and the board reflects the gender composition of employees. The extra motivation leads to more efficient work by employees which decreases the manufacturing costs. The total costs decrease or output increases so the net income will increase and will lead to better financial performance.

More investors call for action on climate change and board diversity (IPE news, 2022). This could mean that investors value companies higher when these companies have better performance on climate change and board diversity. But it is currently unclear if board diversity has a moderating effect on the effect of ESG performance on company financial performance on a west European sample with recent sample data. This information provides evidence for the influence of board gender diversity.

The effect of ESG performance on company financial performance could also be influenced by the sector. For some industries could be ESG performance more important than for other industries. Garcia et al. (2017) find that sensitive industries influences the effect of ESG performance on financial performance. This indicates that the ESG performance differs in importance throughout different industries. The type of industry thus could influence the effect of ESG performance and should be used as a moderating factor. This helps to understand which industries value ESG performance as more important.

Researching this topic is important because it helps to better understand the relation between ESG performance and company financial performance for northwest-European countries. It could provide evidence for an increasing effect due to the board diversity and industry. It helps companies to better understand how to increase financial performance and the importance of ESG performance for their company.

## 1.2 Research objective

This research fills the gap by studying and comparing the effect of ESG performance on company financial performance and the moderating effect of board diversity and industry for north-west European countries. This will contribute existing knowledge for the relation between ESG performance and company financial performance by providing new insights from moderating factors and using the most recently available data. For this research, the following research question is formulated:

- What is the effect of ESG performance on the company's financial performance moderated by board gender diversity and sensitive industries?

The outcome of this research contributes companies and stakeholder with information about the effects of ESG performance on financial performance and which independent variables could moderate this effect. First, Companies can see that they have to increase ESG performance to maximize their income and see the moderating effects to increase financial performance. Second, investors are able compare the outcome of this study and the companies in their portfolio to see if these companies are maximizing their income because these companies have a high ESG performance, a diversified board and operate in an industry which values ESG as important.

Third, this research uses the most recently available data. The demand for higher ESG performance increased over the last years because it increased importance. This study includes more years where ESG performance is more important, so this could lead to other conclusions than studies who already conducted a study with these variables. This study is also unique because it includes the effect of board diversity and industry as moderating variables.

## 1.3 Research methodology

This research will be a quantitative empirical archival study with panel data regression analysis. The research will focus on stock listed companies listed on the prime stock markets from The Netherlands, Germany and Belgium. There are two major variables; ESG performance and company financial performance. The moderating variables are board diversity and industry.

To determine the ESG performance of a company, the database of Refinitiv Eikon will be used. This database includes ESG-scores for stock listed companies and individual scores for

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environmental, social and governance performance. The profitability of a firm will be used to determine the company financial performance. This data will also be provided by the database of Refinitiv Eikon. The profitability can be measured as *return on assets* or *return on equity*. Tobin's Q is also used to indicate company financial performance.

The moderating variables are board diversity and industry. The data for board diversity is provided via Refinitiv Eikon. The diversity of a board is measured by the composition of gender in a board. The industry will be provided from Refinitiv Eikon. The industry is measured via a dummy variable which indicates if a company is in a sensitive industry.

In the next section, the literature review will be discussed which is followed by the hypothesis development and the research model. In the section there after, the research methodology will be discussed. This includes the data source, sample, variables, data analysis and assumption tests. Next the results will be discussed. At the end, there is the conclusion and discussion.

## **2 Literature review**

### **2.1 Introduction**

In this section, a systematic analysis of relevant literature will be provided in the research field of ESG performance, company financial performance, board diversity and sensitive industry. The literature review looks at empirical papers that studied the same relationship as this research will study and papers that studied parts of the relationship this research will study.

#### **2.1.1 ESG performance**

ESG has become a key indicator for risk management, management competence and non-financial performance (Boerner, 2011; Kiernan, 2007). Investors see the importance of ESG performance and ESG is often valued as financially 'material' for the investment portfolio (Galbreath, 2013; Richardson, 2009). ESG performance covers the non-financial performance of a company.



### 2.1.1.1 History

The focus on ESG performance emerged from different solo perspectives in the 1970s (Richardson, 2009). A small group of investors, who were interested in environmental and social practices, focused on ESG combining performance in the field of environment, social and governance. The focus on ESG performance was boosted by two institutions. In 2006, the United Nations launched the Principles of Responsible Investment (PRI) (United Nations, 2006). The PRI set standards for ESG related issues by investments. It focusses on institutional investors to provide standards for responsible investments.

The second institution is Global Reporting Initiative (GRI). This institution helps companies by providing ESG performance. It provides reporting standards for non-financial information which makes it easier for stakeholders to compare ESG performance of different companies (GRI, 2001). This made it more common to provide non-financial reports by companies. It is globally the most used set of standards for nonfinancial performance.

### 2.1.1.2 Environmental, social and governance

ESG performance consists out of environmental performance, social performance and governance. The environmental performance increased in importance in the last decade due to climate change and global warming. More investors demand for sustainable environmental performance which is translated by more environmental friendly performance by companies (IPE news, 2022). The composition of the environmental score could differ between different institutions who measure these scores. Most of the scores contain CO<sub>2</sub>-pollution, waste management and consumption of raw materials (Environmental Performance Index, n.d.; Kocmanova et al., 2012).

Corporate social performance (CSP) can be linked to the principals, practices and outcomes of company's relationships with people, organizations, institutions, communities, societies (Wood, 2016). The CSP started in 1950s and 1960s to understand the influence of company's relationship and how to increase the performance. Kocmanova et al. (2012) find that CSP could be measured via safety on work floor, add to community and employee satisfaction.

The last part of ESG performance is governance. 'Governance encompasses the system by which an organization is controlled and operates, and the mechanisms by which it, and its people,

are held to account. Ethics, risk management, compliance and administration are all elements of governance' (Governance Institute, n.d.). Fukuyama (2013) find that governance can be measured via transparency of accounting methods and stakeholder rights.

### 2.1.2 Company financial performance

The second subject of this research is *company financial performance*. "Financial performance is a complete evaluation of a company's overall standing in categories such as assets, liabilities, equity, expenses, revenue, and overall profitability" (corporate finance institute, n.d.). Companies have to publish their financial performance in their annual report which are publicly available for public firms.

The amount of information about the financial performance changed over time. The rules for reporting requirements started in late 1800s and continuous evolved by information demand of stakeholders (Patton & Hutchison, 2013). This has led to the current situation where (public) company's balance sheet, income statement and cash flows are publicly available. This makes it possible to use the company financial performance in this research.

Company financial performance is used in many studies and can be measured in many ways. One way to measure financial performance is by gross profit margin. It shows the ratio of gross profit over revenue. Other possibilities are working capital, current ratio, inventory turnover, leverage ratio, return on assets (ROA) and return on equity (ROE) (corporate finance institute, n.d.). There is not one best solution as seen in the paper of Barker (1995). The methods differ in balance sheet performance (such as current ratio and leverage ratio) and performance of daily activities (such as Gross profit, ROA and ROE). Gross profit measures the margin a company has for their revenue. The ROA and ROE measures the ratio of profit and invested capital.

### 2.1.3 The influence of ESG performance on company financial performance

ESG performance increased in importance and the demand for high ESG performance by companies increased (IPE news, 2022). Some studies already conducted research for the relationship between ESG performance and company financial performance (Garcia et al., 2017; Velte, 2017). Both of these studies used data from before 2014 which could make the results less

relevant because of increased importance. But these studies can give a starting point of measuring this effect.

The study of Garcia et al (2017) measured ESG performance via the database of Thomson Reuters Eikon. This database provides 70 key performance indicators for different ESG categories. This leads to a total score for environmental, social and governance and a total ESG performance score. For company financial performance was ROA used because it is commonly used in prior research. The study of Velte (2017) used the same variables to measure ESG performance and company financial performance. So, this shows that ESG performance can be measured via the performance score of Eikon. The most common ways to measure company financial performance are with return on assets or with Tobin's Q (Choi, 2009; Garcia et al., 2017; Lin et al., 2015; Velte, 2017).

Concluding from the literature, it is expected that ESG performance has a positive effect on financial performance because stakeholders are likely to see the benefits of ESG performance. Thus, the first hypothesis is:

**H1:** Financial performance is positively influenced by ESG performance

#### 2.1.4 Board gender diversity

Board gender diversity is increasing in importance by stakeholders of the company (IPE news, 2022). It is a part of stakeholder management. Freeman (1984) argues that the management is required to satisfy the need for all stakeholders of the company to maximize the value. The study of Harjoto et al. (2015) finds that more diverse boards are better able to satisfy a larger group of stakeholders. They find gender, tenure and expertise diversities to be the main driver for CSR-activities of firms. This shows a relationship between board diversity and CSR-activities.

The study of Velte (2020) and the study of Nekhili et al. (2021) look at the moderating effect of boards characteristics for the relation between ESG performance and financial performance. The study of Velte looks at the moderating effect of CEO power on the relation between ESG performance and financial performance. The study finds that it (positively) moderates the effect of ESG performance and financial performance.

Nekhili et al. (2021) researched the moderating effect of employee representation in boards to the relation between ESG performance and financial performance. This study used a dummy

variable to indicate if board members were employees or outsiders of the company. The study finds that board representation has a positive moderating effect of ESG performance to financial performance. When board have a high employee representation, the effect of ESG performance on financial performance becomes stronger. Another study focused on the moderating effect of board characteristics on the effect of CSR performance on financial performance (Rossi et al., 2021). They conclude that board characteristics moderate the effect but the study looked at board size and board independence. These studies indicate that various board characteristics could moderate the relation between ESG performance and financial performance.

The study of Kahloul et al. (2022) looked at the moderating role of board diversity and gender composition to the relation of ESG performance and financial performance. The study finds that there is a significant moderating role for board gender diversity. The more gender-divers a board is, the stronger the effect of ESG performance on financial performance. Gender diversity can contribute to strengthening a firm's governance system through the board's effectiveness. Tobin's Q is used to measure financial performance and ESG performance is measured by the score in the database of Thomson Reuters Asset4. The study used a sample of 52 French firms from 2008-2015. The results could be different due to another time period and another sample country, but this indicates a moderating effect of board gender diversity to the relation of ESG performance on financial performance.

The participatory management style of women can lead to active consideration of stakeholders' needs in decision-making. A mix of men and women in a board can led to the optimal outcome for the company. These dynamics enables strategic innovation by making the socially responsible investments more important. This will give the firm a competitive advantage and increases the value of the firm (Adams, 2016)

The literature shows evidence that the effect of ESG performance on financial performance could be moderated by board diversity. Board characteristics could moderate this relationship (Nekhili et al., 2021; Velte, 2020). Prior research finds evidence that there is a moderating role of board gender diversity to the relation between ESG performance and financial performance (Kahloul et al., 2022). Thus, the second hypothesis is:

**H2:** The effect of ESG performance on financial performance is moderated by gender diversity in the board of directors. Firms with a diverse board have an increased effect of ESG performance on financial performance.

### 2.1.5 Sensitive Industries

Industries is in many studies used as a control variable. But industry can also be used as an moderating/mediating effect (Garcia et al., 2017; Lin et al., 2015; Matakanye et al., 2021). The study of Matakanye et al. (2021) showed that industries react differently to pressures for ESG performance. There are many studies which examine the effect of ESG performance on financial performance for a specific industry (Cubbage et al., 2022; Gurol & Lagasio, 2022; Paolone et al., 2021). This indicates that the importance for ESG performance differs across industries and directly effects ESG performance.

Several studies examine the moderating effect of industry on the effect of ESG performance on financial performance (Garcia et al., 2017; Lin et al., 2015). The study of Garcia et al. (2017) focused on sensitive industries and finds that the effect of ESG performance is stronger for sensitive industries<sup>1</sup>. They looked at the profitability (ROA), ESG scores and divided industries in two categories; sensitive and non-sensitive. Some examples of sensitive industries are: energy, chemicals and mining. The study had a sample of 365 firms of BRICS-countries from 2010-2012.

The study of Lin et al. (2015) focused on the moderating effect of industry type. The study also divides industry in sensitive and non-sensitive industry. They marked the same industries as sensitive industries as the paper of Garcia et al. (2017). To determine the profitability, they use ROA. They find that sensitive industries moderate to a stronger effect between CSR performance and financial performance. The sample consists of the 500 largest American companies listed at the S&P 500. The data was collected from 1998 to 2008.

The paper of Matakanye (2021) used six different categories to differentiate the sectors; Basic materials, Consumer goods, Financials, Health care, Industrials and Technology. Another common distribution is two categories indicated by a dummy variable (Garcia et al., 2017; Lin et al., 2015).

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<sup>1</sup> Sensitive industries are those who are subjected to systematic social taboos, moral debates, and political pressures and those that are more likely to cause social and environmental damage.

It depends on the type of research and the importance to specify sector in two or multiple categories.

The study of Matakanye (2021) finds that the sectors 'basic materials' and 'industry' provide the highest level of ESG reporting. These sectors were also classified as sensitive in the study of Garcia et al. (2017) and Lin et al. (2015). Thus, can be concluded that sensitive/non-sensitive industry is a useful distribution for industry.

The literature shows evidence that the effect of ESG performance on financial performance could be moderated by the industry. The ESG performance is valued differently between sectors (Matakanye et al., 2021). Several studies concluded that industry is a moderator for different samples (Garcia et al., 2017; Lin et al., 2015). The sensitive industries are likely to increase the effect of ESG performance on financial performance. Thus, the third hypothesis is:

**H3:** The effect of ESG performance on financial performance is moderated by sensitive industries. The sensitive industries show an increased effect of ESG performance on financial performance compared to the non-sensitive sectors.

## 2.2 Research model

These three hypotheses can be visualized in a theoretical framework. higher ESG performance is expected to lead to higher financial performance. The board gender diversity and industry could change the effect on financial performance. Figure 1 shows the research model of this study.

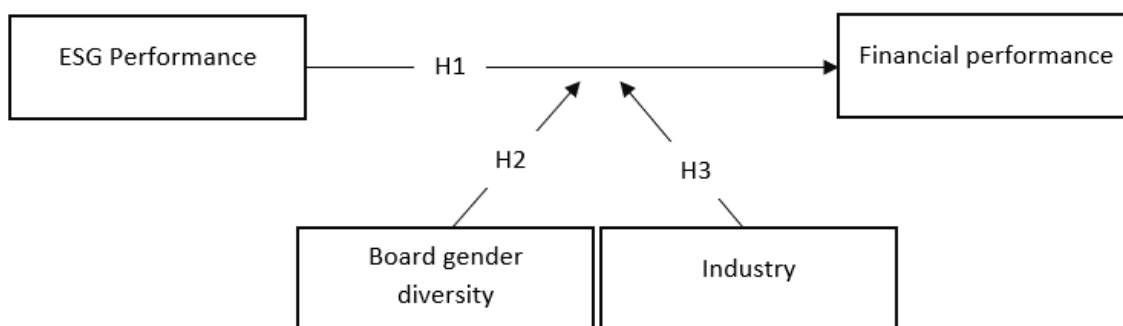


FIGURE 1, RESEARCH MODEL

### 3 Research methodology

In this section, a view of the expected methodology is given. The data sources, variables and research method will be presented.

#### 3.1 Data sources & Sample selection

This study has two main variables (ESG performance and financial performance) and two moderating variables (board diversity and sensitive industry). All of these variables are included in the Revinitive eikon database. This database includes company financial information and non-financial information. It was expected to have all information about ESG performance, financial performance, industry and partly of board diversity. When the information about financial performance was insufficient, the Orbis database was used to add the missing financial information.

When the Revinitive eikon database could not provide all information about board diversity, the database of BoardEx was used to add the missing information. This database includes information about top management of stock listed companies. The databases of Revinitive eikon and BoardEx should contain all information necessary for this research.

##### 3.1.1 Sample

The sample consists of stock listed firms on the prime indexes of the Netherlands (AEX, 25 firms), Belgium (BEL20, 20 firms) and Germany (DAX, 40 firms), as shown in figure 2. These countries have the same financial climate and economical development and are located in north-west Europe. The United Kingdom is not included because this country left the European Union which might influence the results.

The sample period is from 2013-2020. In 2012 there was a small crisis which might influence the outcome of the results (Dutch central institution for statistics (CBS),

Description	Firms	Firm years
AEX	+25	+200
Bel20	+20	+160
Current DAX	+40	+320
<b>Sub total</b>	<b>85</b>	<b>680</b>
Changed stock index	+2	+16
Firm info <3 years	-2	-16
Missing firm year info	n/a	-71
<b>Total</b>	<b>85</b>	<b>609</b>

FIGURE 2, SAMPLE SELECTION

2013). The latest observation year is 2020, because many companies currently working on their annual reports of 2021. This leads to eight observation years and expected 680 firm-year observation.

There are in total 87 different firms because two companies (Royal Dutch Shell and Unilever) moved to the London stock index after 2020. The sample of Dutch stock listed firms are the firms who are currently stock listed at the AEX and Royal Dutch Shell and Unilever. Two companies

(Daimler trucks and Prosus) are left out because there were less than three firm years available for ESG performance data. Multiple other firms had some years missing information but could be used in the panel data regression. The missing info is mostly from the older firm years because ESG information missed.

### 3.2 Dependent variable

The dependent variable is company financial performance. According to the literature it is commonly measured via Return on Assets (ROA) or Return on Equity (ROE) (Shehata et al., 2017; Velte, 2017). ROA shows the return on the total value of equity and debt and thus the whole company assets. ROE shows the return on equity which is the profit/return for shareholders. This research looks at the effect of ESG performance to company financial performance, thus ROA is a better suitable variable to measure company financial performance for this study.

Return on assets is calculated as follows:  $ROA = \frac{EBIT}{\text{bookvalue of equity} + \text{bookvalue of debt}}$

The average book value of equity/debt is calculated by:  $\frac{\text{beginning value (at 1 jan)} + \text{end value (at 31dec)}}{2}$

ROA is accounting based in stead of market based as Tobin's Q. The market value is related to future prospects and the accounting based is related to actual past performance. There is no best option and depends on the relation the study examines (Alghifari et al., 2013). Prior research used ROA as well as Tobin's Q (Garcia et al., 2017; Lin et al., 2015; Velte, 2017). Therefore, Tobin's Q will also be used to calculate financial performance.

Tobin's Q is calculated as follows:  $Tobin's\ Q = \frac{\text{Total market value of the firm}}{\text{Total asset value of the firm}}$



### **3.3 Independent variable**

The independent variable is ESG performance. Prior literature used the ESG-score provided by Revinitive eikon. The score is calculated by comparing seventy different key performance indicators (KPI's) in the realm of environmental, social and governance. The performance at these KPI's lead to a score for each pillar and a total ESG performance score.

The individual score on environmental, social and governance will be used to measure the effect of ESG performance on financial performance. This shows the influence level of the three individual pillars of ESG-score. This could show that one of the individual pillars of ESG performance have a bigger effect on financial performance than the other pillars.

### **3.4 Moderating variables**

This research will study the effect of two moderating variables; Board gender diversity and sensitive industry. According to the literature, board diversity can be measured via gender, tenure and expertise diversities. Gender diversity is a relevant current topic, so this board diversity will be measured via gender.

The second moderating variable is sensitive industry. The literature commonly differentiates two categories; sensitive industries and non-sensitive industries. According to prior research, Mining, Tobacco, Automobiles, Chemicals, Petroleum, Steel and Metals, Transportation equipment and Utility firms are considered as sensitive industries. A dummy variable indicates if an industry is sensitive or not.

### **3.5 Control variables**

To increase the fit of the model, some control variables will be used. These variables are likely to explain a part of the model. The control variables which will be used are: firm size, leverage ratio, board size, year & country. These variables are widely used in prior research as control variables (Choi, 2009; Garcia et al., 2017; Lin et al., 2015; Velte, 2017).

Firm size, leverage ratio and board size are firm specific characteristics which could explain parts of the model. Firm size is measured via the total assets. Leverage ratio is measure as the ratio of

Debt over Equity. When a company has more debt than equity, the leverage ratio is  $>1$ . Board size measures the number of executives in the board of directors.

The variables 'year' and 'country' control for events happened during a year of in a country. For example, if a crisis happened or some higher economic growth in a country. Country is measured via the country of index of a firm. If a firm is listed at the Dutch AEX, it is seen as a Dutch company. The measurement of 'year' explains it selves.

### 3.6 Data analysis method

This research is a quantitative empirical archival study with panel data regression analysis.

#### 3.6.1 Random effects model

To find out which model is appropriate, the Hausman test is conducted. The Hausman test tests if the unique errors ( $u_i$ ) are correlated with the regressors. The null hypothesis states that the random effect is the appropriate model to use (Torres-reyna, 2010). Figure 3 shows the outcome of the Hausman test. The P-value is 0.0733 which is bigger than 0.05. Thus, the null hypothesis cannot be rejected and the random effects model is the appropriate model to use for this study.

Hausman test: Fixed effects - Random effects				
	coefficients		Difference (b-B)	S.E. Sqrt(diag(V_b-V_B))
	Fe (b)	Re (B)		
IR	-0.0001841	-0.000055	0.0001291	0.0000721
	Chi2(1) =	3.21	$(b-B)'[(V_b-V_B)^{-1}](b-B)$	
	Prob>chi =	0.0733		

FIGURE 3, HAUSMAN TEST

Panel data has two available models: fixed effects and random effects. Both models have advantages and disadvantages. The random effects model is able to use more information and therefore more efficient than fixed effects. The dataset has to have a strong exogeneity to use random effects model. When there is no strong exogeneity, it is better to apply fixed effects.

Another disadvantage is that the random effects model is omitted variable bias. The fixed effect model can control for time constant variables but random effects cannot control for omitted variables (Research HUB, 2019)

### 3.6.2 Regression Equation

To test the proposed hypotheses, the following regressions are estimated. The pillars of ESG performance are one year lagged because it is expected that the effect will occur in the next year. Prior research used both ROA as Tobin's Q to indicate financial performance. Tobin's Q is used in the alternative regression for H1. H2 and H3 include an interaction term which show the moderating effect. These will be tested with ROA as financial performance. This will show if there is a moderating effect and does not have to be also tested with Tobin's Q as financial performance. A description of the variables is provided in figure 4.

The panel data regression for **H1**:  $ROA_{it} = \beta_0 + \beta_1 Esc_{i,t-1} + \beta_2 Ssc_{i,t-1} + \beta_3 Gsc_{i,t-1} + \beta_4 Bsize_{i,t} + \beta_5 Fsize_{i,t} + \beta_7 Lev_{i,t} + \beta_7 Year_{i,t} + \beta_8 Country_{i,t} + \epsilon_{it} + a_i + u_t$

The alternative regression for **H1**:  $Tobq_{it} = \beta_0 + \beta_1 Esc_{i,t-1} + \beta_2 Ssc_{i,t-1} + \beta_3 Gsc_{i,t-1} + \beta_4 Bsize_{i,t} + \beta_5 Fsize_{i,t} + \beta_7 Lev_{i,t} + \beta_7 Year_{i,t} + \beta_8 Country_{i,t} + \epsilon_{it} + a_i + u_t$

The panel data regression for **H2**:  $ROA_{it} = \beta_0 + \beta_1 Esc_{i,t-1} + \beta_2 Ssc_{i,t-1} + \beta_3 Gsc_{i,t-1} + \beta_4 Bdiv_{i,t} + \beta_5 Esc * Bdiv_{i,t} + \beta_6 Ssc * Bdiv_{i,t} + \beta_7 Gsc * Bdiv_{i,t} + \beta_8 Bsize_{i,t} + \beta_9 Fsize_{i,t} + \beta_{10} Lev_{i,t} + \beta_{11} Year_{i,t} + \beta_{12} Country_{i,t} + \epsilon_{it} + a_i + u_t$

The panel data regression for **H3**:  $ROA_{it} = \beta_0 + \beta_1 Esc_{i,t-1} + \beta_2 Ssc_{i,t-1} + \beta_3 Gsc_{i,t-1} + \beta_4 Inds_{i,t} + \beta_5 Esc * Inds_{i,t} + \beta_6 Ssc * Inds_{i,t} + \beta_7 Gsc * Inds_{i,t} + \beta_8 Bsize_{i,t} + \beta_9 Fsize_{i,t} + \beta_{10} Lev_{i,t} + \beta_{11} Year_{i,t} + \beta_{12} Country_{i,t} + \epsilon_{it} + a_i + u_t$

Variable	Description
ROA	Return on Assets, Financial performance
Tobq	Tobin's Q, Market value vs Book value
Esc	Environmental performance score. Between 0-100
Ssc	Social performance score. Between 0-100
Gsc	Governance performance score. Between 0-100
Gdiv	Gender Diversity. Between 0-100
inds	Proxy to indicate sensitive industries
Fsize	firm size measured by lognormal of total assets
Lev	Leverage ratio
Bsize	Size of the board
Year	Year specific characteristics
Country	Country of firm (1=NL, 2=BE & 3=DE)

FIGURE 4, DESCRIPTION OF EQUATION VARIABLES

## 4 Results

This chapter describes and provides an analysis of the empirical observations of this study. The chapter has a structure which provides first the descriptive statistics of the variables. Next, the requirements of the regression analyses will be provided which includes a test for heteroscedasticity and multicollinearity. After these analyses, the results of the regression are analyzed to test the hypotheses.

#### 4.1 Descriptive statistics

The empirical analyses start with the descriptive statistics. The final sample consists of 609 firm year observations across 85 different firms between 2013 and 2020. Figure 5 provide the descriptive statistics.

VARIABLE	OBS	MEAN	STD. DEV.	MIN	MAX
<i>ROA</i>	609	0.0459113	0.05622379	-0.33	0.35
<i>Tobin's q</i>	609	1.200181	1.504709	0.01	13.88
<i>ESG-score</i>	609	68.90248	18.70431	3.25	94.49
<i>E-score</i>	609	67.96639	24.62086	0	98.17
<i>S-score</i>	609	72.11363	21.0071	2.32	98.24
<i>G-score</i>	609	65.79869	20.82521	3.21	98.56
<i>Board diversity</i>	609	0.295156	0.1080388	0	0.6
<i>Board size</i>	609	12.1445	4.829883	3	22
<i>Sensitive indus. *</i>	609	0.2857143	0.4521253	0	1
<i>Firm size (log)</i>	609	10.39673	0.7538103	8.57	12.23
<i>Leverage ratio</i>	609	3.686338	7.015065	-61.38	61.95
<i>Year *</i>	609	4.7	2.270704	1	8
<i>Country*</i>	609	2.178982	0.861733	1	3

FIGURE 5, DESCRIPTIVE STATISTICS (\*=DUMMY VARIABLE)

The ROA has a mean of 4.6% and a standard deviation of 5.62% which indicates that the ROA is volatile and has a high deviation. The individual components of ESG show that the S-score has the highest mean value and the G-score the lowest. Figure 6 shows the distribution of the ESG-score. The distribution is concentrated to the right side of the score.

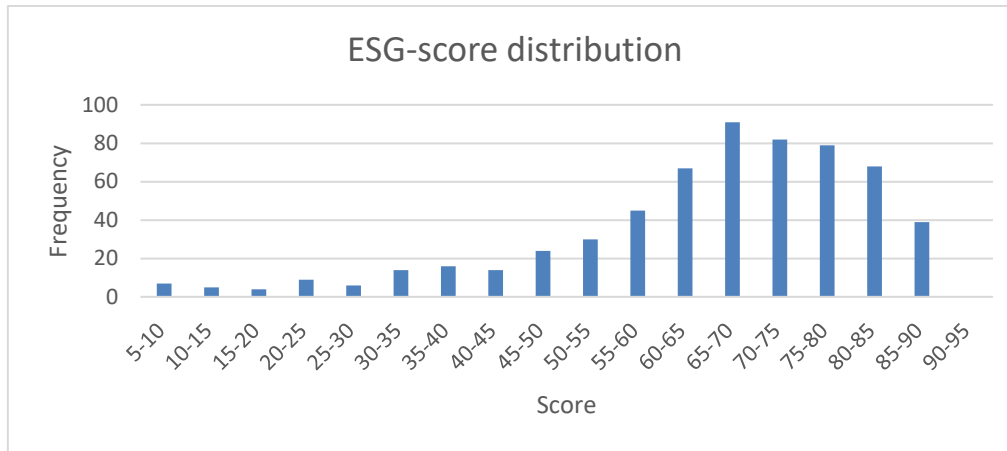


FIGURE 6, ESG-SCORE DISTRIBUTION

The mean value for board diversity indicates that the average firm has 30% women in their board. Sensitive industries show a mean value of 0.286 and thus 28.6% of the firm-year observation operates in a sensitive industry.

## 4.2 Requirements of regression analyses

### 4.2.1 Heteroscedasticity

To test whether the residuals are equal over the range of values measured, a test for heteroscedasticity is conducted. The Breusch-Pagan / Cook-Weisberg test has been used. When the variance for residuals is unequal, it could lead to invalid results. The test analyzes if the variance is constant over time. The null-hypothesis states that the variance is constant. The test statistic of the Breusch-Pagan / Cook-Weisberg test is 766.20 and the P-value is 0.000. Thus, the null hypothesis can be rejected because the variance of the error term is not constant. To correct for heteroscedasticity, robust standard errors are used for each regression.

### 4.2.2 Multicollinearity

Multicollinearity occurs if independent variables are correlated with each other. High correlation between independent variables influences the fit of the model and results. A power correlation test is conducted to test for multicollinearity. The scale is from -1 to +1 and 0 means that there is no correlation between the variables. Figure 7 shows the correlation between the variables. Correlation  $>0.75$  are considered to be strongly correlated (Statology, 2020).

The ESG-score is highly correlated with its individual components which is logical because the individual scores combined, provide the ESG score. For this reason, the individual pillars of ESG-score are used for the regression analyses in stead of both (as provided in paragraph 3.6.2). The E-score has a high correlation with S-score. This also makes logical sense because firms which see the importance of environmental performance are likely to see the importance of social performance. This correlation is high, but both variables can still be used because it is below the 0.75 threshold.

Another high correlation is between firm size and board size. This was expected because bigger firms are likely to have a bigger boards size. The other correlations are below 0.5 which can be considered as a low/moderate correlation.

	ROA	ESG-score	E-score	S-score	G-score	Bdiv	Bsize	Inds	Fsize
ROA	1								
ESG-score	0.1063	1							
E-score	0.1494	0.8409*	1						
S-score	0.1036	0.8834*	0.675	1					
G-score	0.0053	0.7294	0.4532	0.4468	1				
Board div.	0.1699	0.3145	0.2417	0.2812	0.2663	1			
Board size	-0.0187	0.2708	0.3409	0.2357	0.0857	0.0615	1		
Ind. Sens.	0.0421	0.185	0.2101	0.1481	0.1024	-0.1262	0.146	1	
Firm-size	-0.1709	0.4023	0.5098	0.2641	0.3023	0.0381	0.5338	0.0964	1
Leverage	-0.2023	0.0998	0.2072	0.0226	0.0971	0.019	0.1637	-0.1337	0.4903
Year	-0.0781	0.1269	-0.0003	0.1471	0.1407	0.4524	-0.1076	-0.0556	-0.0441
Country	-0.0432	0.1003	0.115	0.1396	-0.0452	-0.1198	0.5439	0.164	0.1647

	Lev	Year	Country
Leverage	1		
Year	-0.0514	1	
Country	0.0785	-0.0294	1

FIGURE 7, CORRELATION MATRIX (\* = <0.75)

### 4.2.3 Cointegration

Cointegration is tested to analyze whether variables have a stable relationship in the long run, when time series are non-stationary. The Kao panel-data cointegration test is conducted to test if the dataset contains cointegration. The null-hypothesis states that the dataset is free of cointegration. The unadjusted dickey-fuller test shows a statistic result of -16.8773 and a P-value of 0.000. Thus, can be concluded that the null hypothesis can be accepted and that the sample does not contain cointegration.

## 4.3 Regression results

In this section, the hypotheses are tested via a panel data analyses with robust errors. The data covers multiple firms and multiple years and therefore is both longitudinal as cross-sectional. The dataset is classified as a panel data set. To correct for heteroscedasticity, robust errors will be used.

### 4.3.1 Regression 1

Figure 8 shows the first regression for H1 with ROA as firm financial performance. The regression has one-year lagged variables for the pillars of ESG score and therefor has 524 observations in stead of 609 (as mentioned in 3.1.1 sample). The overall fit is 0.08 which is quite low. The relation between E-score & S-score and ROA is positive but not significant because the P-value is higher than 0.05. The G-score has a negative relation which is significant. This indicates that higher G-score results in a lower ROA. The control variables are also not significant. The Rho is 0.79 which indicates that the variance is not constant over time.



ROA	Coefficient	Standard error	P>Z
escore	0.00032	0.00021	0.12300
sscore	0.00011	0.00017	0.52400
gscore	-0.00033	0.00011	0.00300***
bsize	0.00095	0.00113	0.39700
fsize	-0.01250	0.01071	0.24300
lev	-0.00015	0.00032	0.63900
time	-0.00083	0.00066	0.21000
country	-0.00620	0.00813	0.44600
constant	0.17234	0.11139	0.12200
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.0809	Rho:	0.7909

FIGURE 8, REGRESSION 1 WITH ROA (\*=p<10%, \*\* p<=5%, \*\*\* p<=1%)

Figure 9 shows the first regression with Tobin's Q as firm financial performance. The regression has the same number of observations and only changed Tobin's Q in stead of ROA. The overall fit of the model is 0.27 and is higher than the regression with ROA. The pillars of ESG are not significant. The control variables *firm size*, *year* and the *constant term* are significant because the P-value is lower than an alpha of 0.10. The Rho is 0.83 which indicates that the variance of this regression is less constant over time than the variance of the regression with ROA.

Tobin's Q	Coefficient	Standard error	P>Z
escore	0.00482	0.00398	0.22600
sscore	-0.00079	0.00366	0.83000
gscore	-0.00327	0.00517	0.52700
bsize	0.01867	0.02656	0.48200
fsize	-1.69346	0.54234	0.00200***
lev	0.01170	0.00886	0.18600
time	0.06347	0.01862	0.00100***
country	0.08662	0.17808	0.62700
constant	18.08478	5.38293	0.00100***
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.2720	Rho:	0.8352

FIGURE 9, REGRESSION 1 WITH TOBIN'S Q (\*= $p < 10\%$ , \*\*  $p < 5\%$ , \*\*\*  $p < 1\%$ )

The normal regression and the alternative regression do not support H1 because the E-score and S-score are not significant. The G-score is also not significant in the alternative regression model. Therefore, H1 is rejected.

#### 4.3.2 Regression 2

The second regression tests if board diversity has a moderated effect on ESG performance to financial performance. Figure 10 shows the second regression for H2 with ROA as firm financial performance. The regression includes board diversity and three interaction terms '*escore\*b-div.*', '*sscore\*bdiv.*' and '*gscore\*bdiv.*' The overall fit of the model increased to 0.12 compared to regression 1 (0.08) and the Rho slightly decreased to 0.76. The E-score and G-score show a significant relation, which is positive for E-score and negative for G-score. The S-score does not show a significant relation.

The added variable 'board diversity' shows a positive relation, however this relation is not significant. The interaction term for S-score show a significant positive relation. The other two interaction terms do not show a significant relation. The hypothesis can not be supported because the variable board diversity and two interaction terms are not significant. Therefore, H2 is rejected.

ROA	Coefficient	Standard error	P>Z
escore	0.000457	0.000225	0.042**
sscore	-0.00013	0.000234	0.57
gscore	-0.00025	0.000108	0.02**
bdiv	0.02509	0.05138	0.625
escore*bdiv	-0.00069	0.000425	0.104
sscore *bdiv	0.001469	0.000805	0.068*
gscore *bdiv	-0.00054	0.000435	0.213
bsize	0.000665	0.001191	0.576
fsize <sub>log</sub>	-0.01237	0.009701	0.202
lev	-0.00013	0.000335	0.696
time	-0.00176	0.000893	0.049**
country	-0.00534	0.008404	0.525
Constant	0.164705	0.104578	0.115
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.1223	Rho:	0.7605

FIGURE 10, REGRESSION 2 WITH ROA (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

### 4.3.3 Regression 3

The third regression tests if sensitive industries have a moderated effect on ESG performance to financial performance. Figure 11 shows the third regression for H3 with ROA as firm financial performance. The regression includes the dummy variable for sensitive industries (*sens*) and three interaction terms '*escore\*sens*', '*sscore\*sens*' and '*gscore\*sens*'. The overall fit of the model is 0.09 which is quite low. The Rho is 0.79 which is comparable to the first regression model.

The E-score shows a positive relation with ROA and is significant at an alpha of 0.10. The relation of G-score and ROA is negative and significant at an alpha of 0.01. The S-score is positive but not significant. The dummy variable for sensitive industries is positive and significant. The interaction term '*escore\*sens*' is also significant but negatively related. The other interaction terms are not significant.

This means that sensitive industries have a moderated effect on the relation of ESG performance on financial performance because the variable and one interaction term is significant. However, the direction of the moderating effect is inverse of the expected direction of H3. Therefore, H3 can not be accepted. The negative coefficient of the interaction term indicates that the relation between ESG performance and financial performance is weaker for sensitive industries.

ROA	Coefficient	Standard error	P>Z
escore	0.000356	0.00021	0.09*
sscore	0.000163	0.000176	0.354
gscore	-0.00032	0.000104	0.002***
sens	0.089828	0.034586	0.009***
Escore*sens	-0.00047	0.00021	0.025**
Sscore*sens	-0.0004	0.000314	0.208
gscore*sens	-0.00022	0.000394	0.581
bsize	0.000927	0.001082	0.392
fsize <sub>log</sub>	-0.01129	0.009823	0.25
lev	-0.00019	0.000308	0.547
time	-0.00065	0.000621	0.298
country	-0.00792	0.008279	0.339
Constant	0.153958	0.103841	0.138
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.0885	Rho:	0.7910

FIGURE 11, REGRESSION 3 WITH ROA (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

#### 4.4 robustness check

In addition to the standard regressions a robustness check analysis is performed. In the robustness check analysis, slight changes are made to the model and the results are compared to the results of the standard regressions.

##### 4.4.1 Regression 1, no lag

The first robustness check is to test if the assumption of lacked ESG influence is correct. In the original regression was assumed that ESG performance influenced next years performance. Figure

12 shows the analyses without the lagged E-score, S-score and G-score. The number of observations is 85 higher because every firm-year observation can be taken into the regression.

The overall fit of the model barely increased to 0.086 compared to 0.081 in the original regression model. The Rho decreased from 0.79 to 0.74 which indicates that the variance is more distributed than the original model. The G-score also has a negative significant coefficient and the other main variables are not significant (except for time).

ROA	Coefficient	Standard error	P>Z
escore	0.00024	0.00020	0.20900
sscore	0.00040	0.00024	0.10100
gscore	-0.00037	0.00016	0.02200**
bsize	0.00075	0.00092	0.41600
fsize	-0.01302	0.01063	0.22000
lev	-0.00022	0.00034	0.51000
time	-0.00109	0.00060	0.07100*
country	-0.00688	0.00733	0.34800
Constant	0.16972	0.11288	0.13300
Nr. of observation:	609	Observations per year:	85
Average observations per year	6.2	Maximum years	8
R-squared overall:	0.086	Rho:	0.7433

FIGURE 12, REGRESSION 1 WITH ROA, NON-LAGGED (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

Figure 13 shows the non-lagged first regression with Tobin's Q as indicator for financial performance. The overall fit of the model increased from 0.272 to 0.2950 which indicates that the non-lagged regression has (slightly) more explanatory power. The Rho also decreased with 0.033 to 0.802. The variance is thus more evenly distributed. The main variables are not significant, even as the original model. The variables *firm size*, *time* and *the constant term* are significant as in the original model.

The overall fit of the non-lagged models increased and the distribution of the variance became more even. The change is limited and the main variables were not significant. The non-lagged influence of ESG performance makes less natural logic sense. The ESG-score is determined at the end of the year/after the year. This should not influence the financial performance of that same year. Thus, can be concluded that the original model is appropriate to use.

Tobin's Q	Coefficient	Standard error	P>Z
escore	0.00479	0.00458	0.29500
sscore	0.00293	0.00397	0.46100
gscore	-0.00779	0.00671	0.24500
bsize	0.00977	0.01757	0.57800
fsize	-1.50914	0.40990	0***
lev	0.01196	0.00789	0.12900
time	0.05994	0.01644	0***
country	0.07140	0.17274	0.67900
constant	16.34562	4.15802	0***
Nr. of observation:	609	Observations per year:	85
Average observations per year	7.2	Maximum years	8
R-squared overall:	0.2950	Rho:	0.8020

FIGURE 13, REGRESSION 3 WITH TOBIN'S Q, NON-LAGGED (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

#### 4.4.2 Regression 1, 2-year lag

The original regression had the assumption that ESG performance is one-year lagged. It could also be more years lagged. To test the robustness of the one-year lagged, figure 14 shows the regression with the two-year lagged E-score, S-score and G-score.

The overall fit of the model decreased to 0.06 compared to 0.08 in the original model. The Rho increased to with 0.12 points to 0.91. The variance is less evenly distributed compared to the first model. The same variables are significant and non-significant as the original model, except leverage is not significant anymore.

ROA	Coefficient	Standard error	P>Z
escore	0.00003	0.00017	0.87200
sscore	0.00016	0.00015	0.28200
gscore	-0.00018	0.00010	0.07600*
bsize	0.00009	0.00112	0.93700
fsize	-0.02040	0.01550	0.18800
lev	0.00002	0.00019	0.93100
time	-0.00090	0.00076	0.23800
country	-0.00169	0.01062	0.87400
Constant	0.26114	0.14853	0.07900*
Nr. of observation:	439	Observations per year:	85
Average observations per year	5.2	Maximum years	6
R-squared overall:	0.0594	Rho:	0.9074

FIGURE 14, REGRESSION 1 WITH ROA, 2-YEAR-LAGGED (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

Figure 15 shows the two-year lagged regression with Tobin's Q as indicator for financial performance. The overall fit slightly decreased to 0.268 in stead of 0.272 in the original regression model. The Rho increased to 0.893 compared to 0.835. The coefficients of the original model and this model are quite the same and the same variables are significant.

The 2-year lagged model for ROA and Tobin's Q show a decreased fit and higher Rho which makes these model less useful than the original models used. The significant variables are the same and this model does not show any major differences. Thus, can be concluded that the original model with one-year-lagged regression was the most appropriate model.



Tobin's Q	Coefficient	Standard error	P>Z
escore	-0.00042	0.00388	0.91500
sscore	0.00158	0.00261	0.54400
gscore	-0.00132	0.00281	0.64000
bsize	0.01512	0.03271	0.64400
fsize	-1.99170	0.78227	0.01100**
lev	0.01008	0.00961	0.29400
time	0.05854	0.02001	0.00300***
country	0.11635	0.22331	0.60200
constant	21.29723	7.71695	0.00600***
Nr. of observation:	439	Observations per year:	85
Average observations per year	5.2	Maximum years	6
R-squared overall:	0.2676	Rho:	0.8929

FIGURE 15, REGRESSION 1 WITH TOBIN'S Q, 2-YEAR-LAGGED (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

#### 4.4.3 ESG score in stead of pillars

This reached used the individual pillars of ESG performance in the regression analyses. A robustness analyses is conducted to test if the total ESG-score changes the results of the regression. The ESG-score is lagged for one year because the previous paragraphs showed that this is the most logical lag-period. The following regressions are contested:

- The panel data regression for **H1**:  $ROA_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 Bsize_{i,t} + \beta_3 Fsize_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Year_{i,t} + \beta_6 Country_{i,t} + \epsilon_{it} + a_i + u_t$
- The alternative regression for **H1**:  $Tobq_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 Bsize_{i,t} + \beta_3 Fsize_{i,t} + \beta_4 Lev_{i,t} + \beta_5 Year_{i,t} + \beta_6 Country_{i,t} + \epsilon_{it} + a_i + u_t$

Figure 16 shows the regression analyses with ROA as financial performance. The overall fit of the model decreased to 0.060 compared to 0.081 in the original model. The Rho increased to 0.818 in stead of 0.791 which indicates that the variance is less equal distributed. The coefficients of the variables are not significant and thus cannot be concluded which direction the relation is.

ROA	Coefficient	Standard error	P>Z
ESG	0.00001	0.00022	0.94800
bsize	0.00094	0.00108	0.38300
fsize	-0.00957	0.01232	0.43700
lev	-0.00016	0.00027	0.55900
time	-0.00087	0.00070	0.21000
country	-0.00441	0.00779	0.57100
constant	0.14450	0.12627	0.25200
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.0599	Rho:	0.8175

FIGURE 16, REGRESSION 1 WITH ROA AND ESG-SCORE (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

Figure 17 shows the regression analyses with Tobin's Q as financial performance. The overall fit of the model slightly increases from 0.272 to 0.280 compared to the original model. The Rho also increased and thus the variance is less equally distributed. The same variables as in the original model are significant with quite the same coefficients.

These two regression analyses show not much difference compared to the original model. The model with ROA has 2% less fit and the model with Tobin's' Q 1% more fit. This does indicate that the original model is correct to use and ESG-score is not more useful to use in the regression.

Tobin's Q	Coefficient	Standard error	P>Z
ESG	0.003322	0.003035	0.274
bsize	0.017768	0.027492	0.518
fsize	-1.70019	0.552824	0.002***
lev	0.011593	0.009057	0.201
time	0.056396	0.017406	0.001***
country	0.102357	0.189416	0.589
Constant	17.99706	5.408462	0.001***
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.2799	Rho:	0.8403

FIGURE 17, REGRESSION 1 WITH ROA AND ESG-SCORE (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

#### 4.4.4 Moderation of board diversity with Tobin's Q

Figure 18 shows the second regression with Tobin's Q as firm financial performance. The overall fit of this model increased slightly to 0.28 in stead of 0.272 in the first model. The overall fit is higher than the model with ROA as financial performance. The Rho is 0.835 equal as in the first model with Tobin's Q. The variance is not constant over time.

The pillars of ESG are not significant, but they are significant in the model with ROA. The added variable board diversity shows a negative relation but this relation is not significant. The interaction term 'gscore\*bdiv' is significant but the other two interaction terms are not significant. The control variables which were significant in the original model are still significant. This model shows a higher explanatory power but does not support H2. Therefore, can be concluded that the model with ROA was appropriate to use.

Tobin's Q	Coefficient	Standard error	P>Z
escore	0.001408	0.00287	0.624
sscore	-0.00291	0.003602	0.419
gscore	-0.00015	0.00402	0.97
bdiv	-0.43463	0.831751	0.601
escore*bdiv	0.016865	0.011395	0.139
sscore*bdiv	0.022808	0.01483	0.124
gscore*bdiv	-0.02619	0.015002	0.081*
bsize	0.013665	0.024532	0.578
fsizelog	-1.65977	0.505218	0.001***
lev	0.011672	0.008294	0.159
time	0.052145	0.028106	0.064*
country	0.081611	0.181562	0.653
Constant	17.83948	4.994086	0***
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.2805	Rho:	0.8345

FIGURE 18, REGRESSION 2 WITH TOBIN'S Q (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

#### 4.4.5 Moderation of sensitive industries with Tobin's Q

Figure 19 shows the third regression for H3 with Tobin's Q as firm financial performance. The overall fit of the model is 0.31 and the Rho is 0.84 which is quite similar as the first regression model with Tobin's Q. The coefficients of the E-score, S-score and G-score are not significant. The variable for sensitive industries is not significant even as the interaction terms. This indicates that sensitive industries do not moderate the effect between ESG performance and financial performance when Tobin's Q is used to measure financial performance. This is a different conclusion than the model with ROA as financial performance indicator.

Tobin's Q	Coefficient	Standard error	P>Z
escore	0.003828	0.003501	0.274
sscore	-0.00223	0.003736	0.55
gscore	0.000815	0.00272	0.764
sens	0.882431	1.739963	0.612
Escore*sens	0.015396	0.009831	0.117
Sscore*sens	0.001635	0.006181	0.791
Gscore*sens	-0.03518	0.023791	0.139
bsize	0.021729	0.023707	0.359
fsize <sub>log</sub>	-1.61794	0.390889	0***
lev	0.013435	0.007296	0.066*
time	0.075916	0.020147	0***
country	0.084047	0.169237	0.619
Constant	17.17801	3.773387	0***
Nr. of observation:	524	Observations per year:	85
Average observations per year	6.2	Maximum years	7
R-squared overall:	0.3081	Rho:	0.8484

FIGURE 19, REGRESSION 3 WITH TOBIN'S Q (\*=P<10%, \*\* P<=5%, \*\*\* P<=1%)

## 5 Conclusion and discussion

This chapter discusses the results and try to give explanations for exhibited results. It also concludes the findings, explains about the limitations of this research and suggests future research directions.

## 5.1 Hypothesis 1

The first regression model tries to find the relation between ESG performance and financial performance. It was tested via ROA and Tobin's Q. The model with Tobin's Q had a higher overall fit than the model with ROA but both models did not find a significant relation.

In the robustness checks is tested if the lagged effect of ESG performance was too long or short. The checks found that shorter lag resulted in a higher slightly fit of the model, but this didn't make natural sense. The company should first report about the ESG performance before the financial performance should be influenced. The longer lagged effect decreased the fit of the model, which means that 2-year lag has less explanatory power. In the robustness checks was also tested if the variable ESG-score differs the results instead of individual scores. The ESG-score did not make a significant difference and the adjusted model showed less explanatory power.

In this study is no significant relation found between ESG performance and financial performance. Therefore, H1 is rejected.

### 5.1.1 Explanation hypothesis 1

The overall fit of the original model was quite low, especially for the model with ROA. Some important explanatory variables are missing. The study of Lin et al. (2015) also conducted an analysis between ESG performance and financial performance. This study used the variables *Capital intensity*, *R&D intensity* and *intellectual capital* and had an overall fit of 0.31 with ROA. This model has a higher fit than the model of H1.

Another study used ownership variables (institutional/employee/family), R&D expenditures and the control variables used in the model for H1 (Nekhili et al., 2021). The study does not show the fit of the model, but the variables are significant. These missing variables can be used in future research to find the relation between ESG performance and financial performance. Both studies had more firm years which could also explain the higher fit of the model.

Future research could combine these variables to check for a higher explanatory power. It is also recommended to increase the sample size/period. ESG performance becomes more important, so a study which is conducted in 5-years could find more significant results.

## 5.2 Hypothesis 2

The second hypothesis tries to find the moderating effect of board gender diversity to the relation of ESG performance and financial performance. The second regression had a higher explanatory power than the first regression which indicates that the new added variables have explanatory power. The moderating effect is not found because two of the three moderating variables are not significant, even as the variable board gender diversity.

In this regression was the *E-score* and the *G-score* significant compared to only the *G-score* in the first regression. This could be explained due to the higher explanatory power by the new added variables. The interaction term '*S-score\*Board gender diversity*' and the variable *time* were also significant. The moderating effect was also tested with Tobin's Q as financial performance indicator but this regression did also not show a moderating effect of board gender diversity to the relation of ESG performance and financial performance. This regression also showed a higher overall fit compared to regression model 1. Therefore, H2 is rejected.

### 5.2.1 Explanation hypothesis 2

The overall fit of the model with ROA (0.12) is quite low but compared to the first hypothesis, but board gender diversity has increased the overall fit. This indicates that the variable should be included in a regression but a moderating effect cannot be concluded.

Some major explanatory variables are missing in this regression. The study of Nekhili et al. (2021) includes more board/employee characteristics. These variables are 'number of employees in board', 'board size', 'board independence' and 'number of board meetings'. The study of Kahloul et al. (2022) also used different variables and did find a moderating effect of board gender diversity to the relation of ESG performance and financial performance. This study used the variables 'board size', 'board independence' and a dummy variable to indicate if the chair of the board is also the CEO.

Both of these studies used board size and board independence. Regression 2 did not include *board independence* and could have a higher fit if this variable was included. The other missing explanatory variables could be the same as explained in 5.1.1.

### 5.3 Hypothesis 3

The third hypothesis tries to find the moderating effect of sensitive industries to the relation of ESG performance and financial performance. Regression 3 showed a slightly increase in explanatory power compared to the regression 1. The moderating effect was found because the variable *sensitive industry* and one interaction term '*e-score\*sensitive industry*' are significant. The E-score and G-score show a significant effect compared to only the G-score in regression 1.

The moderating effect was also tested with Tobin's Q as financial performance indicator but no significant moderating effect was found. The independent variables of ESG-score and the new added variables for sensitive industries were not significant. This was a strange result because the prior regression had the same result between ROA and Tobin's Q. Thus, can be concluded that there is a moderating effect when ROA is used as financial performance indicator but not for Tobin's. However, H3 expected a positive moderating effect for sensitive industries, but a negative moderating effect is found. Therefore, H3 is rejected.

#### 5.3.1 Explanation hypothesis 3

The difference between the result of ROA and Tobin's Q could be due to the difference in explanatory power of the regression model. The model with ROA has an overall fit of 0.09 and the model with Tobin's Q 0.31. Tobin's Q is a market-based indicator and ROA is book-value-based indicator. This could also be an explanation. The book value of a company is influenced differently when the firm is in a sensitive industry, but the market value does not change. Shareholder value the effect of ESG performance on financial performance the same for sensitive and non-sensitive industries because the moderating effect is not found with Tobin's Q.

The overall fit of regression 3 is quite low and comparable to regression 1. The variable for sensitive industries adds not much to the explanatory power of the model. It is likely that the same major explanatory variables are missing as in regression model 1. The variables mentioned in 5.1.1 should be used in future research.

Regression 3 showed a moderating effect of sensitive industries to the relation of ESG performance and financial performance. The negative correlation indicates that the effect of ESG performance on financial performance is weaker for sensitive industries. This effect could be



because these firms are already in a polluting industry, so their ESG-score effects their financial performance less. It is for these companies more profitable to continue with low ESG performance than to increase the ESG performance and potentially attract more customers.

This contributes to the existing knowledge about ESG performance. Firms in sensitive industries are less stimulated to increase ESG performance because the effect of financial performance (ROA) is less than for firms in non-sensitive industries. Policy makers could use this knowledge to adjust regulation of sensitive industries to increase firm's ESG performance.

#### **5.4 Research question**

This study aimed to answer the research question: 'What is the effect of ESG performance on the company's financial performance moderated by board gender diversity and sensitive industries?'. This was tested via three hypotheses. The combined results of these hypotheses lead to the answer to the research question.

The first hypothesis was about the effect of ESG performance on company financial performance. This hypothesis could not be accepted with regression model 1 because only one individual pillar of ESG performance was significant and H1 was therefore rejected. The second hypothesis tried to find the moderating effect of board gender diversity on relation of ESG performance on company financial performance. This regression showed that the ESG performance had a significant effect of financial performance but this effect was not moderated by board gender diversity. Thus, hypothesis 2 is also rejected. The third hypothesis tried to find the moderating effect of sensitive industries on relation of ESG performance on company financial performance. In this regression, the effect of ESG performance on financial performance was showed and the negative moderating effect of sensitive industries was also significant. This was for the model with ROA as financial performance indicator. The model with Tobin's Q did not show a moderating effect of sensitive industries.

Thus, can be concluded that the ESG performance has an effect on financial performance when moderated effects are considered. Regression model 1 lacked explanatory variables which model 2 and model 3 had. The moderating effect of board gender diversity is not found and assumed to not excised. The moderating effect of sensitive industries is found on relation of ESG performance

on company financial performance (with ROA as performance indicator). The effect of ESG performance on financial performance is weaker for sensitive industries.

## **5.5 Limitations of the study**

It must be acknowledged that this research contains several limitations. These limitations could cause the results to be flawed. The first limitation was the sample size which contained only 524 firm year observations. The time period was started after the end of euro-crisis. This could influence the results, therefore the first firm-year started in 2013. This limits the total firm-years. Due to time constrains, it was not possible to increase the number of firms. This could be achieved by including more countries.

The second limitation was the time constraints. The study had a limited time period of five months which influenced the sample size of the study and the number analysis which were conducted.

The third limitation is that all the data was obtained from the database Revinitiv Eikon. The study relies on the reliability and correctness of the obtained data from this database. This database contained all information needed for this study but due to time constraint, it couldn't be checked in other databases.

## **5.6 Future research**

This research added new insights to the existing knowledge of the effect of ESG performance on financial performance moderated by board gender diversity and sensitive industries. It showed that non-financial performance has an effect on financial performance and this relationship is moderated by firm characteristics. Future research could study other moderating firm characteristics. The ESG performance is becoming more important (CFI education, n.d.), thus future studies with the latest data are likely to find a increased effect of ESG performance.

The used regressions models showed a relatively low overall fit which indicates that major explanatory variables are missing or the sample size was not correct. It is recommended to increase the sample size to more countries to study the effect of ESG performance on financial performance to increase the number of firm years. It is also recommended to add more control

variables to the regression model which could increase the explanatory power of the model. These variables could be ownership structure, R&D expenditure, growth rates and more board characteristics. These changes could lead to different results of the regression analyses.

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