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The effect of ESG performance on financial firm performance.

An empirical analysis of publicly listed companies on the NASDAQ.

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Abstract:

This paper examines the relationship between ESG performance and financial firm performance for companies listed on the NASDAQ from 2002 until 2022. ESG performance is measured as the MSCI rating for overall ESG performance and the three individual pillars: Environmental, Social and Governance. This paper diversifies financial firm performance into three main proxies: Stock return, Earnings Per Share and Tobin's Q. The main findings show that ESG performance has a significant positive effect on Earnings Per Share and depending on the regression specification on Tobin's Q, but there is no significant relationship between ESG performance and Stock return.

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Introduction

In the past years the incorporation of environmental, social and governance aspects of firms has been increasing in the investment decisions by investors and financial analysts (Adomako & Tran, 2022; Alcaide González et al.,2020; Ali et al.,2020; Alshbili & Elamer,2019; Christensen et al.,2022;Elmagrhi et al.,2019). In the last two decades the importance of environmental, social and governance aspects has even further increased since the creation and implementation of the social development goals in 2015. According to Consolandi et al., (2020) The Sustainable development goals created a guideline for investors and companies to allocate resources and further highlight ESG standards. Furthermore, previously companies have focused mainly on profit maximization, however there has been a shift towards more sustainability focused business (Kraus et al.,2018). Despite the growing importance of ESG performance there has been limited research into the effects of ESG performance. This paper tries to add to the existing literature on possible effects of ESG performance by analyzing the effect of ESG performance on financial firm performance. In this paper financial firm performance will be measured as earnings per share (EPS), Tobin's Q and stock returns.

Previous research on the effect of ESG performance on financial firm performance shows an ambiguous relationship between these key variables. Most of the existing literature shows a positive relationship between ESG performance and financial firms performance (Verheyden et al., 2016; Giese et al., 2019). This is in line with the growing importance of ESG related performance and the awareness of environmental, social and governmental problems we face today. Firms which try to tackle or limit these pressuring problems, would be the better financial performing firms. On the contrary, there has been research which conclude a negative effect of ESG performance on financial firm performance (Brammer et al., 2006; Crisóstomo et al., 2011). Finally, existing research also shows instances where there is no significant relationship between ESG performance and financial firm performance (Nelling & Webb, 2009). The reason for different results could be motivated by the different environments in which these studies have been conducted. It is important to acknowledge the environment in which research is conducted as legal systems, culture, time periods and economic factors could affect the possible relationship between ESG performance and financial firm performance (Porta et al., 1998; Buchanana et al., 2018). Next to these factors there could be endogeneity when analyzing the effect of ESG performance on financial firm performance. For instance a firm's current ESG scores might be highly correlated with a firm's previous ESG scores. Adding the endogeneity of ESG scores over time, political and cultural differences between regions and countries it is very is very important to address the possibility of endogeneity. As when the endogeneity problem is not addressed properly this could temper with the results (Bae et al., 2019).

This research tries to solve the endogeneity problem by adding lagged values of ESG performance in the regression analysis.

From the inconclusive results of previous research conducted on the effect of ESG performance on financial firm performance this research tries to answer the following research question:

Is there a relation between ESG performance and financial firm performance for listed companies within the NASDAQ?

Following the introduction this research paper is structured as follows. First, in chapter 2 the existing literature on the effect of ESG performance on financial firm performance is analyzed. From this multiple hypotheses will be formulated to answer the research question. Second, in chapter 3 the data, sample and variables will be defined. From this the methods of analysis will come forward and be discussed. Additionally, in chapter 4 the results stemming from multiple econometrical test will be discussed. To conclude, in chapter 5 the key findings of this research are discussed and possible limitations will be addressed with possible acknowledgements for future research.

Literature overview

In this chapter, literature on the dependent variable financial firm performance and the independent variable ESG performance will be analyzed. Next to this the results of existing research on the effect of ESG performance on financial firm performance will be outlined. Additionally, multiple theories on the effect of ESG performance on financial firm performance will be laid out.

ESG pillars

To understand the effect of ESG performance on financial firm performance it is very much so necessary to analyse the pillars which construct the overall ESG ratings. ESG performance is measured through the Environmental, Social and Governance pillars. The environmental pillar concerns key point of interest such as climate change, deforestation, air and water pollution, land exploitation and biodiversity loss. In line with this research previous research has looked into the effect of environmental performance of a firm on their financial performance. Derwall et al. (2014); Manrique & Martí-Ballester (2017) find that environmentally well performing firms, more eco-friendly, enjoy higher stock return than poor performing firms.

The second pillar, the social pillar, considers topics such as gender policies, protection of human rights, labor standards, workplace and product safety, public health and income distribution. Previous research on the effect of performance within the social pilar on firm performance uses employee satisfaction as an independent variable proxy for the social ESG pillar. Previous research shows a positive relationship between employee satisfaction and firm performance (Edmans, 2011). Next to that Latif et al., (2013) find a positive relation between employee job satisfaction and firm performance controlled for intrinsic and extrinsic rewards, which influence employee satisfaction.

Finally, the third pillar, the governance pillar, concerns variables such as board independence, shareholder's rights, and anti-competitive practices. Existing research shows a positive relationship between the quality of governance and firm performance (Velte, 2017; Gompers et al., 2003).

Financial firm performance

Financial firm performance is an economic variable which reflects the ability of a firm in using material and human resources to achieve certain targets. Financial firm performance also considers the efficiency of using business means during the process of production and consumption. Financial firm performance therefore shows the correlation between output results and input resources which were employed in the process of business operations (Truong & Tran, 2009). In this research the measures for financial firm performance will be earnings per share, Tobin's Q and stock returns.

Tobin's Q

The q ratio was first introduced in 1969 by James Tobin as a predictor of a firm's future investments (Tobin 1969). Since then the measure has been used to explain a wide variety of phenomena. For example as an alternate measure of business performance (Chen and Lee, 1995). The q ratio has several appealing qualities as a financial-market indicator. It is founded on the robust empirical and theoretical foundations of the efficient market hypothesis (Fama 1997; Ball, 1995) as well as addressing the emerging concerns over the limitations of accounting measurements of performance such as return on assets, ROA, and return on equity, ROE, (Benston 1985, Fisher and McGowan, 1983). Tobin's Q is measured as the ratio of a firm's market value of outstanding shares to its equity and liabilities book value (Wang et al., 2015). Tobin's Q has been used by industrial organization economists and strategy researchers to examine how market power affects performance, particularly when accounting measures have been unable to identify any performance effect. Tobin's Q is forward looking and future profitably orientated and does not fluctuate with scale. Albuquerque et al., (2019) find that CSR has a positive effect on a firm's performance proxied by Tobin's Q (Albuquerque et al., 2019). Additionally Liang and Renneboog, (2017) find that cash and in-kind asset donations both have a significant positive effect on firm performance measured as Tobin's Q. Cash and in kind donations are a key variable of corporate philanthropy, which is linked with the social pillar of ESG (Gautier and Pache, 2013). This finding goes against the agency theory and is in line with the value-enhancement theory (Liang and Renneboog, 2017). In line with the stated research on the effect of ESG related variables on a firm's financial performance proxied by Tobin's Q the following hypothesis is formulated.

H1: ESG performance has a positive effect on Tobin's Q

Earnings per share

Earnings per share (EPS) has been considered the key market measure of firm performance (Thune & House, 1970;Rumelt, 1974;Kudla, 1980; Bourgeois, 1980). It applies a different view than accounting based measures such as ROE and ROA, as it is defined as the net income of a company entitled to a common stock shareholder. Both Tobin's Q and EPS overcome the major disadvantage of accounting based measures of financial firm performance of reflecting firm's past performance and fail to create an indication of future firm performance (Michel & Shaked, 1984). Moore (2001) finds a positive relationship between overall ESG performance and financial firm performance measured as earnings per share. Additionally Ahmad et al., (2021) finds a significant positive effect of ESG performance on a firm's earnings per share. In line with the cited research the following hypothesis is formulated.

H2: ESG performance has a positive effect on earnings per share

Stock return

Research on the effect of ESG performance on stock returns has been limited, however there has been research on specific variables which are related to the ESG pillars on stock returns. For instance Flammer (2015) finds that CSR proposals that are approved by the shareholders of a firm lead to abnormal stock returns. In line with this Dimson et al., (2015) finds that changes in a firm's CSR policy also lead to positive abnormal stock returns. Lins et al., (2017) research the effect of social capital on stock returns of non-financial firms during the 2008 financial crisis. They find that firm with higher levels of social capital enjoy significantly higher stock returns during the crisis. In addition to that Gompers, Ishii and Metrick (2003) find that corporate governance has a significant effect on stock returns. Firms with strong shareholder rights enjoy risk-adjusted stock returns that are on average 8.5% higher than firms with weak shareholder rights (Core et al., 2006). They controlled this for governance causing unexpected cash flows, which might increase or decrease the abnormal returns. According to Eccles, Ioannou and Serafeim (2014) firms which fulfill sustainability requirements have superior market performance. Finally, Friede et al., (2015) finds that most of the studies on the effect of ESG performance related variables on stock market returns show a positive relation between ESG performance and stock returns. From this the following hypothesis is formulated.

H3: ESG performance has a positive effect on stock returns

Theories on the effect of ESG performance on financial firm performance

In the existing literature there are two main theories on the effect of ESG performance on financial firm performance. There is a distinction between the shareholder and stakeholder theory. Within the shareholder theory agency problems play a large role. The information asymmetry between the managers and shareholders causes managers to make decisions that lead to self-improvement, but could destroy shareholder value, due to extra costs (Billio et al., 2021). The perfect example of this is the level of ESG overinvestment managers indulge in. According to Barnea and Rubin (2010) managers overinvest in ESG for their own benefits, while limiting the shareholders' value. In line with this, firms with significantly high ESG ratings have lower shareholder value during negative economic events (Liu et al., 2020). High ESG ratings are an indicator of commitment from the company to provide value to their customers. In case of a negative event like a product recall customers raise questions regarding the ESG rating of the firm. This has a negative effect on the firm's performance. Additionally, shareholder theory searches for investment opportunities that maximized shareholders' value. When overinvesting in ESG, this limits the free cash flow to the firm to pursue shareholder maximizing investment or operations (Benlemlih & Bitar, 2018).

Opposite of the shareholder theory's negative relationship between ESG performance and financial firm performance the stakeholder theory could explain a positive effect of ESG performance on financial firm performance. Once again the stakeholder theory is significantly based on the agency problem theorem and information asymmetry. In the case of the stakeholder theory there is information asymmetry between the managers and the stakeholders of the firm (Nguyen et al., 2022). According to Freeman (1984) ESG could solve the agency frictions between management and stakeholders. ESG positive policies can also be labeled as stakeholder friendly policies as it betters the environment in which stakeholders are related to the company. Multiple studies identify different channels through which ESG could solve the agency problem with regard to the stakeholders of a company. First off, companies with stakeholder friendly policies issue less short term debt. According to Yarram and Fisher (2021) companies with lower short term debt levels could resolve the information asymmetry and agency problem between managers and significant stakeholders of the company. Second, better ESG performance can reduce the cost of debt and equity through the decrease in information asymmetry between the stakeholders and managers of firms (Cui et al., 2018; Dhaliwal et al., 2011; Bhuiyan & Nguyen, 2020). The lower cost of debt and equity is a key catalyzer for improvement in financial firm performance. Additionally, superior ESG performance creates more stakeholder loyalty and commitment, through improved firm reputation (Branco & Rodrigues, 2006; Arouri et al., 2019; Turker, 2009). Most of the above cited literature suggests a positive relationship between ESG performance and financial firm performance. This suggests more empirical evidence for the stakeholders theory as this theory explains possible positive effects of ESG performance on financial firm performance .

Methodology

Data & Sample

This research looks at the effect of ESG performance on financial firm performance for companies listed on the NASDAQ. The sample for this research consists of the time period from 2002 to 2022. The data on ESG performance will be gathered from DataStream by Refinitiv. Data on ESG performance is measured yearly. The ESG performance data is collected by MSCI, which started scoring companies in the year 2002. The sample ends in 2021 as this is the latest data available for majority of the companies, as we are still early in 2023 so there is limited data for 2022. The sample consists of a total of 2806 companies with available data for ESG performance, financial firm performance and control variables for the researched time span. Companies which have not been present on the NASDAQ for the entire time span have been removed of the database, which explains why the amount of observations in this research is lower than the amount of companies present on the NASDAQ today. To limit the influence of outliers part of the dataset will be Winsorized. The variables Return, EPS, Tobin's Q, Assets, D/E and R&D will be reshaped. The top 5% of observations will be assigned the value of the 95th percentile. The bottom 5% of observations will be assigned the value of the 5th percentile within the dataset.

Variables

Firm performance

To measure financial firm performance this research identifies three different measures. First, earnings per share (EPS) will be measured as a company's profit divided by the outstanding share of common stock. Earnings per share will be measured in American Dollars per year. Second, Tobin's Q is measured as the ratio of a firm's market value of outstanding shares and book value of its liabilities to the book value of a firm's equity and liabilities (Wang et al., 2015). The formula for Tobin's Q: (Equity Market Value + Liabilities Book Value) / (Equity Book Value + Liabilities Book Value) is gathered from DataStream by Refinitiv. Tobin's Q will be measured as a ratio ranging from 0 to infinity per year. Finally, stock returns are measured as the yearly average of daily returns calculated by DataStream. Stock returns will be measured as a percentage change in the stock price measured in US dollars annually.

ESG performance

ESG performance is measured as a number provided by MSCI. The most commonly used ESG performance indicator is the MSCI ESG ratings database. The overall goal of MSCI ratings is: "MSCI ESG Ratings are designed to help institutional investors understand ESG risks and opportunities and enable them to integrate these factors into their portfolio construction and management process.

MSCI ESG Ratings aim to measure a company's resilience to long-term, financially relevant ESG risks" (MSCI, 2022). In the database the overall ESG performance score will be available along with the individual pillar scores. MSCI ESG performance scores range from zero to one hundred. Zero indicating the worse possible performance, whereas one hundred indicates a perfect score.

Control variables

To research the effect of ESG performance on financial firm performance multiple control variables will be included. Following existing literature on financial firm performance this research includes firm size, leverage and R&D expenditure as control variables (Bebchuk et al., 2009).

First, firm size is included as a control variable. According to Beck et al., (2005) there is considerable evidence that firm size is related to a firm's productivity, survival, and profitability. The size of a firm can impact the sensitivity of a firm to its environment. Schiffer and Weder (2001) compare the effect of firm size on the ability to obtain financing, accessing legal systems and dealing with corruption. They find smaller firms experience significantly more obstacles within the three dimensions. Research shows that larger firms are less adversely affected by obstacles when trying to obtain financing, access legal systems and dealing with corruption (Beck et al., 2005). In this research firm size is measured as total assets. Overall the existing literature suggests a positive relationship between firm size and financial firm performance.

Third, the effect of leverage or debt financing on financial firm performance is included as a control variable. Opler & Titman (1994) find that during economic downturns sales decreases could be positive or negative for leveraged firms. The authors research the effect of leverage on firm value and performance. If the sales losses are customer or competitor driven we would expect to observe the more significantly leveraged firms to lose value and decrease their performance during industry downturns relative to their less leveraged competitors. If the financial discipline produces a more efficient competitor, then the more highly leveraged firms should gain in value relative to the less leveraged firms in their industries. Yazdanfar & Öhman (2015) find that short and long term debt have a negative effect on profitability. Increased debt ratios create accompanying agency costs and increased risks of losing control over the firm. Literature on debt ratios and leverage suggests the relationship between debt and financial firm performance could be a double edged sword. In this research the debt to equity ratio will be measured as the percentage of total debt to common equity retrieved from Refinitiv DataStream.

Finally, R&D expenditures has been included as a control variable. Research on the effect of R&D expenditures on financial firm performance shows us that it is commonly thought that firms engaging in R&D, tech companies for instance, provide superior stock price performance. However if

we look at the historical returns of firms which heavily engage in R&D and those which do not there is no significant difference (Chan et al., 2001). The hypothesis that the market on average correctly values any future returns from R&D is not fully satisfied as companies with a high ratio of R&D expenditure to equity market value have significant excess returns (Chan et al., 2001). In this research R&D will be measured as total R&D expenditures per year retrieved from Refinitiv DataStream.

Methods

To get an overview of the available data to research the effect of ESG performance on financial firm performance a summary table was created, which shows key statistics of the variables of interest. Some of the dependent and control variables showed extreme outliers. To control for these outliers the variables Return, Earnings Per Share, Tobin's Q, Total assets, R&D expenditure and total Debt to common equity have been Winsorized. In this way outliers can be made less influential, without removing them from the dataset. The variables Assets and R&D have been divided by a 100,000 to create a more similar scale for all variables considered. Looking at the mean, median and standard deviations of the dependent variables the summary table shows that stock returns observations are dispersed. The mean stock return is 7%. About 90% of all observations are within a two standard deviation from the mean, indicating that 90% of the stock return data is between -27.8% and 44%. Earnings per share shows a less dispersed distribution as the mean is $1.15 and 90% of observations is in between $0.11 and $4.65. Regarding Tobin's Q the data shows a mean value of 2.328 and a standard deviation of 1.750. This indicates 90% of the Tobin's Q observations are between 0.885 and 5.828.

Table 1: summary statistics

	ESG	ENV	SOC	GOV	Return	EPS$	TOBQ	Assets	R&D	D/E
Minimum	0.44	0.03	0.10	0.16	-0.278	0.11	0.885	0.150	0.01	-118.23
Median	31.42	22.67	34.41	42.64	0.06	1.15	1.596	6.374	0.29	44.35
Mean	34.96	30.59	38.03	43.6	0.07	1.62	2.328	28.621	1	74.72
Maximum	95.91	98.55	98.94	98.53	0.490	5.86	7.273	214.184	6.95	392.45
Standard deviation	17.574	24.418	19.908	22.072	0.185	1.516	1.750	53.652	1.737	112.117
NA's	45064	52129	45069	45069	25018	38031	25758	21807	41954	30505

Considering overall ESG performance and the individual pillars, the dataset shows very similar minimum, median, mean and maximum values. This might indicate correlation between the overall ESG score and the ESG pillars, or even the correlation between the ESG pillars themselves. This problem is called multicollinearity. Multicollinearity means a change in one independent variable will affect other independent variables, thus temper with the results of the econometric model. Initially

to check for high correlation between the ESG variables the mean scores of all companies combined over time per year been graphed (graph 1-4 in the appendix). The graphs show very similar paths over time, indicating a high correlation between the variables. To formally check for possible multicollinearity between the ESG variables a correlation table has been created. The table shows overall ESG performance has a moderate to high correlation with all three independent pillars. To limit the problem of multicollinearity the overall ESG performance score is the main independent variable. Additionally three separate regressions will be conducted with the ESG pillars as independent variables per dependent variable.

Table 2: Correlation table

ESG	ENV	SOC	GOV
1	0.696	0.761	0.596
0.696	1	0.683	0.362
0.761	0.683	1	0.358
0.596	0.362	0.358	1

To test for possible autocorrelation within the model a Durbin-Watson test will be conducted. The Durban Watson test shows a statistic value of 1.97. Whenever a Durban Watson test shows a value below 2 there is positive autocorrelation present within the model. This means that the error terms in the future are based on current error terms and error terms in the past.

Table 3: Durbin-Watson test

	Statistic	Method	Alternative	P.value
DW	1.972615	Durbin-Watson test	true autocorrelation is not 0	0.3787175

In the Introduction the potential issue of endogeneity within the independent variable ESG performance has been discussed. In line with Bae et al., (2019) this research added lagged values for the independent ESG variables. The added lagged variables help limit the correlation between the independent ESG variables and the error term.

A potential issue with using OLS to model panel data is that one is not accounting for fixed and random effects. Fixed Effects are effects that are independent of random disturbances, in other words time invariant observations. Random Effects are effects that include random disturbances. To analyze the effect of ESG performance on financial firm performance within a panel data set a fixed effects analysis or random effects analysis are the most used econometric tools. Statistically, fixed effects panel analysis is always a reasonable thing to do with panel data, but it may not be the most efficient model to run (Landi & Sciarelli, 2018). A fixed effects regression allows us to control for

time invariant unobservable individual characteristics of the observations, as a fixed effects model estimates a parameter for each firm. A random effects model considers that firm-specific terms are randomly distributed (Ahmad et al, 2021). When the fixed effects model is correlated with the independent variables the random effects model will be inconsistent (Baltagi, 1995). To control for correlation between the fixed effects model and the independent variables a Hausman test will be conducted. The Hausman test shows a p-value of 0.8898, which means we can't reject the null hypothesis of the random effects model being the superior model for this dataset.

Table 4: Hausman test

Hausman test		
Chisq = 1.1279	Df = 4	p-value = 0.8898
Alternative hypothesis: One model (random effects model) is inconsistent		

Hence, to research the effect of ESG performance on financial firm performance the following random effects regressions will be conducted. The subscripts $_i$ and $_t$ represent the company identifier and time indictor respectively. For each formula the same regression will be ran four times with overall ESG performance, the environmental pillar, the social pillar and the governance pillar as independent variable substitutes, respectively.

Formula 1: Random effects formula with stock return as dependent variable and Overall ESG performance as independent variable.

$$Return_{it} = \mu_t + \text{ß1ESG}_{it} + \text{ß2Assets}_{it} + \text{ß3DE}_{it} + \text{ß4R\&D}_{it} + \alpha_i + \varepsilon_{it}$$

Formula 2: Random effects formula with Tobin's Q as dependent variable and the Overall ESG performance as independent variable.

$$Tobin'sQ_{it} = \mu_t + \text{ß1ESG}_{it} + \text{ß2Assets}_{it} + \text{ß3DE}_{it} + \text{ß4R\&D}_{it} + \alpha_i + \varepsilon_{it}$$

Formula 3: Random effects formula with earnings per share as dependent variable and Overall ESG as independent variable.

$$EPS_{it} = \mu_t + \text{ß1ESG}_{it} + \text{ß2Assets}_{it} + \text{ß3DE}_{it} + \text{ß4R\&D}_{it} + \alpha_i + \varepsilon_{it}$$

Within these formulas the μ_t represents an intercept for each period in time. We have a fixed part μ_t, the population error ε_{it}, and a random part α_i which offers entities to deviate from that average. From the two parted intercept we need two error terms to allow for individual deviations from the average intercept. The random effects regression formulas contain two separate error terms α_i& ε_{it}. α_i is an error term that only varies across firms, whereas ε_{it} varies across time and firms. α_i can be

regarded as the error term that captures all time invariant variables and unobservable variables. ε_{it} captures all random variation in the dependent variable at each point in time for each firm (D.Allison, 2009).

In the next chapter the above random effects regression analyses will be conducted and analyzed to come to a final conclusion if there is a relation between ESG performance and financial firm performance for companies listed on the NASDAQ.

Results

Return

First, the random effects model with return as the dependent variable has been conducted. The regression output shows an insignificant positive coefficient for the variable ESG. Similarly to the overall ESG score the ESG pillars show an insignificant positive coefficient. The coefficients for Assets, Debt to equity and R&D all show an insignificant value. The small coefficients are due to the significant difference in size of cumulative average yearly return and the control variables, even though Assets and R&D are divided by 100,000 to make the size of the variables more comparable. The output shows an R^2 value of 0.001 which indicates this model only predicts 0.1% of total variation in stock returns. Additionally, the output shows an insignificant F statistic of 0.112, which means we can't reject the null hypothesis. This indicates that a model without independent variables, only including an intercept, fits the data as well as this model including independent and control variables. The output shows an insignificant coefficient for overall ESG, which means we can't reject the null hypothesis of no relationship between ESG and financial firm performance measured as stock return. This finding is robust for using different estimation and regression methods. Table 8 and 9 in the appendix show similar insignificant results for the effect of ESG performance on stock return when estimated with a simple OLS and fixed effects regression.

Table 5: Random effects regression output with stock return as dependent variable.

	Dependent variable:			
	Return_win			
	(1)	(2)	(3)	(4)
ESG	0.0001			
	(0.001)			
ENV		0.0003		
		(0.001)		
SOC			0.0003	
			(0.001)	
GOV				0.0002
				(0.001)
Assets_win	0.00002	-0.0001	-0.0001	-0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	0.0001	0.00001	0.00001	0.00001
	(0.0002)	(0.0003)	(0.0002)	(0.0002)
RD_win	-0.002	0.003	0.0005	0.0004
	(0.014)	(0.020)	(0.016)	(0.016)
Constant	0.059	0.049	0.050	0.056
	(0.043)	(0.044)	(0.043)	(0.043)
Observations	2,875	1,638	2,796	2,796
R^2	0.001	0.002	0.002	0.001
F Statistic	0.112	0.132	0.170	0.073

Note: $^{*}p<0.10$ $^{**}p<0.05$ $^{***}p<0.01$

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Tobin's Q

Second, a random effects regression with Tobin's Q as the dependent variable has been conducted. The output shows different results than the above random effects regression on stock return. Overall ESG performance shows a marginal significant positive coefficient of 0.003. A unit increase in the overall ESG score leads to a 0.003 unit increase in a firm's Tobin's Q. This means the ratio of a firm's equity market value and liability book value to equity and liability book value will increase. However, a 0.003 unit increase in a firm's Tobin's Q does not imply anything significant. A two standard deviation increase in overall ESG performance would lead to an increase of 0.105 in a firm's Tobin's Q. This indicates that a two standard deviation increase in a firm's overall ESG performance would lead to a 6.61% increase on the median of Tobin's Q. The significant coefficient indicates we can reject the null hypothesis of no relationship between ESG performance and Tobin's Q. This is in line with hypothesis 1: *ESG performance has a positive effect on Tobin's Q.* Considering the effect of the individual ESG pillars the output shows no significant effect. However, the random effects model with lags included for all ESG variables shows that the lagged value of the environmental and social pillar both have a significant positive effect on a firm's Tobin's Q. On the contrary, the lagged value of the governance pillar shows a significant negative effect.

Additionally, Assets has a significant negative effect on a firm's Tobin's Q. A 100,000 US dollar increase in a firm's assets would decrease a firm's Tobin's Q with 0.011. A positive relation between assets and debt has been concluded by multiple researchers (Rajan and Zingales, 1995 & Frank and Goyal, 2003). An increase in total assets of a firm will indirectly increase its book value of liabilities, thus decreasing a firms Tobin's Q (Mitton, 2008).

Furthermore, R&D shows a significant positive coefficient. The coefficient indicates that a 100,000 US dollar increase in R&D expenditure leads to a 0.242 increase in a firm's Tobin's Q. For this regression analysis we have a total of 4,295 observations, which is almost double the observations of the regression analysis with stock return as dependent variable. The increase in observations and the increased comparability of numbers could be the reason for a higher R^2. Finally this model shows a significant F statistic, which means we can reject the null hypothesis of a model without independent variables being suited for this data.

Table 6: Random effects regression output with Tobin's Q as dependent variable

	Dependent variable:			
	TOBQ_win			
	(1)	(2)	(3)	(4)
ESG	0.003*			
	(0.001)			
ENV		0.002		
		(0.001)		
SOC			-0.0003	
			(0.001)	
GOV				0.001
				(0.001)
Assets_win	-0.011***	-0.010***	-0.007***	-0.007***
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	-0.001***	-0.001***	-0.001***	-0.001***
	(0.0002)	(0.0003)	(0.0002)	(0.0002)
RD_win	0.242***	0.159***	0.122***	0.122***
	(0.026)	(0.031)	(0.025)	(0.025)
Constant	3.131***	3.054***	3.226***	3.166***
	(0.068)	(0.075)	(0.069)	(0.070)
Observations	4,295	2,365	4,135	4,135
R^2	0.071	0.048	0.049	0.049
F Statistic	186.356***	95.927***	100.986***	102.014***

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

* *A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Earnings per share

Third, a random effects regression with EPS as dependent variable has been conducted. Similar to the random effects regression with Tobin's Q as the dependent variable this regression output shows a significant positive coefficient for ESG performance. The coefficient of 0.013 indicates that a one unit increase in overall ESG performance leads to a 1.30 Dollar cent increase in a firm's earnings per share. A two standard deviation increase in overall ESG performance leads to a 46 Dollar cent increase in a firm's earnings per share. This is a 39.72% increase on the median of the dataset.

Most of the positive relationship between overall ESG performance and EPS comes from the social pillar as this shows a significant positive coefficient of 0.003. From the significant coefficient for ESG performance we can reject the null hypothesis of no relationship between ESG performance and EPS. The significant coefficient for ESG performance is in line with hypothesis 2: *ESG performance has a positive effect on earnings per share.*

The random effects analysis including lags for the ESG variables within the appendix shows that lagged overall ESG, the lagged environmental pillar and the lagged social pillar all have a significant positive effect on EPS. The findings on the effect of ESG performance on EPS are robust for different estimation methods. The results for a simple OLS and fixed effects regression show the same significant positive relationship between ESG performance and earnings per share.

Different from the other regression analyses a firm's debt to equity ratio shows a significant positive coefficient for the regression output with the social and governance pillar. This is contradictory to Yazdanfar & Öhman (2015) who found that debt has a negative effect on profitability. However, the literature on debt to equity and leverage is a double edged sword, which is shown in the findings of the effect of debt to equity ratios on different dependent variables as a proxy for financial firm performance.

Despite this regression analysis having the least observations the model still shows a R^2 of 0.114, which is higher than Ahmad et al., (2021) who conclude a significant positive relationship between ESG performance and EPS with a R^2 of 0.047. Additionally, the model shows a significant F statistic. This means we can reject the null hypothesis of a model without independent variables being suited for this data.

Table 7: Random regression output with earnings per share as dependent variable

	Dependent variable:			
	EPS_win			
	(1)	(2)	(3)	(4)
ESG	0.013***			
	(0.002)			
ENV		0.001		
		(0.002)		
SOC			0.003*	
			(0.002)	
GOV				-0.002
				(0.002)
Assets_win	0.008***	0.012***	0.012***	0.012***
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	0.0004	0.001	0.001**	0.001**
	(0.0004)	(0.001)	(0.0004)	(0.0004)
RD_win	0.071**	-0.029	-0.027	-0.026
	(0.035)	(0.042)	(0.035)	(0.035)
Constant	0.795***	1.029***	0.950***	1.131***
	(0.106)	(0.110)	(0.104)	(0.107)
Observations	1,944	1,158	1,968	1,968
R^2	0.114	0.163	0.138	0.139
F Statistic	213.654***	156.090***	240.922***	239.514***

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

* *A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Discussion

In this part of the research paper the limitations of this research and recommendations for further research will be laid out. This research tries to add to the literature on ESG performance and its effect on firm performance.

A potential issue within this research was the endogeneity within the dataset. Research by Bae et al., (2019) on the effect of CSR on the costs of high leverage discussed the problem of endogeneity. This research put forward the best way to deal with endogeneity is through instrumental variables. An instrumental variable has a causal effect on the independent variable ESG performance and does not directly affect the dependent variable financial firm performance. To put the instrumental variable into work a Two Stage Least Squares (TSLS) regression can be conducted. This research however tries to solve a part of the endogeneity problem by adding lags to the regression analyses. For further research finding an instrumental variable and running a TSLS regression would help to limit the endogeneity within the data.

Additionally, this research measured financial firm performance as stock return, earnings per share and Tobin's Q. This indicates a focus on market based measures of firm performance. It could be very interesting to further develop the potential relationship of ESG performance on firm performance, by comparing the effect of ESG performance on market based measures and accounting based measures such as ROA, ROE and ROI.

Furthermore, the random effects model analyzing the effect of ESG performance of stock returns showed an insignificant F statistic, which means the random effects model including independent variables and control variables was no better fit than the model without independent variables and control variables. The fit of the model could be improved by including more control variables such as: firm age, quick ratio and dividends per share[1]. Additionally, an autoregressive distributed lag model (ARDL) could be ran including both independent and dependent variable lags as within stock prices there is often autocorrelation present.

[1] Sayedy, B., & Ghazali, M. Z. (2017). The Impact of Microeconomic Variables on Stock Return by Moderating of Money Supply. Asian Social Science, 13(12), 191.

Conclusion

This research tries to answer the question: *Is there a relation between ESG performance and financial firm performance for listed companies within the NASDAQ?* The possible relationship between ESG performance and firm performance has been analyzed with three key proxies for firm performance. First, the effect of ESG performance on stock returns has been analyzed. The results indicate that the null hypothesis of no relationship between ESG performance and stock returns could not be rejected. This is contradictory with literature, which suggests there is a general positive relationship between ESG performance and stock returns (Friede et al., 2015).

Second, the possible relationship between ESG performance and Tobin's Q has been researched. From the results a marginally significant positive relationship between ESG performance and Tobin's Q was concluded. This is in line with existing literature (Albuquerque et al., 2019; Liang and Renneboog, 2017) which found evidence for a positive relationship between ESG performance and financial firm performance measured as Tobin's Q.

Finally, the relationship between ESG performance and earnings per share was researched. Results indicate a positive relationship between ESG performance and earnings per share. This is in line with the literature, which conclude a positive relationship between ESG performance and earnings per share (Ahmad et al., 2021).

The three hypotheses formulated from existing literature all indicated a positive effect of ESG performance on financial firm performance. Both hypotheses with Tobin's Q and earnings per share resulted in evidence of a positive relationship between ESG performance and financial firm performance. On the contrary there was no significant relationship found between ESG performance and stock returns. To answer the research question: *Is there a relation between ESG performance and financial firm performance for listed companies within the NASDAQ?* This research concludes that ESG performance does have a relationship with financial firm performance for companies listed on the NASDAQ. However this relationship does not exist for all proxies of financial firm performance.

This research tries to add to the literature on the effects of ESG performance. ESG has been gaining interests the last two decades, which makes it a very interesting topic. The NASDAQ is one of the world's largest stock exchanges, which also creates an incentive to analyze the effect of ESG performance on financial firm performance for companies listed on the NASDAQ. This research found a marginally significant positive relationship between ESG performance and a firm's Tobin's Q and a significant positive relationship between ESG performance and a firm's earnings per share. This research therefore found evidence for investment opportunities within the field of ESG for firms to improve their financial performance.

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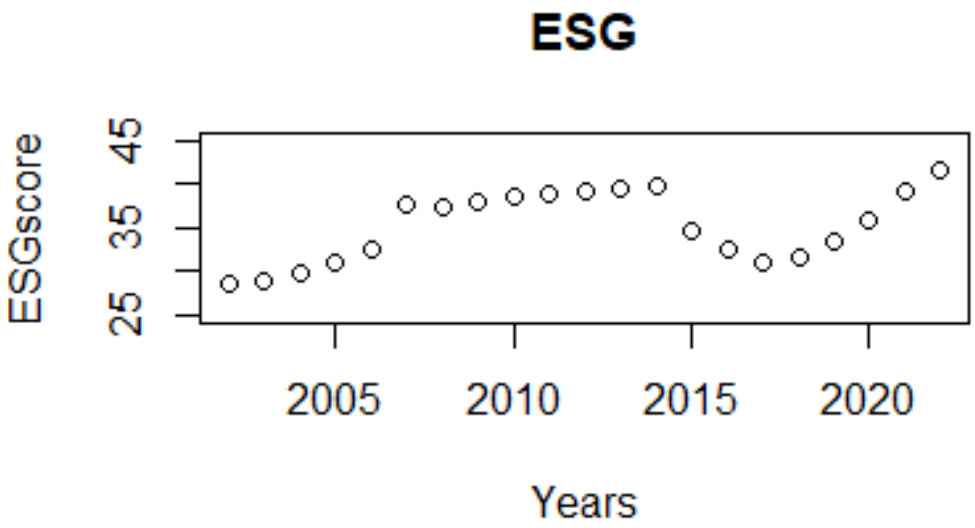
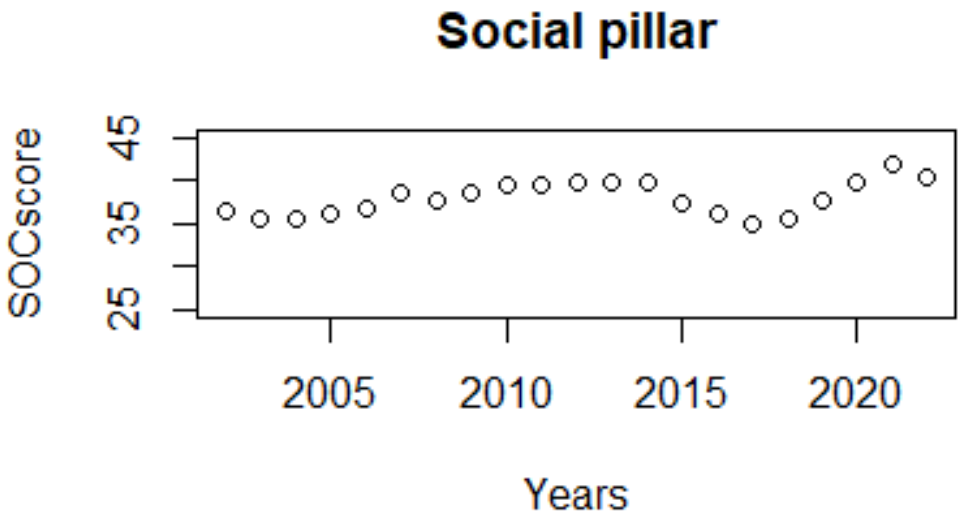
Appendix

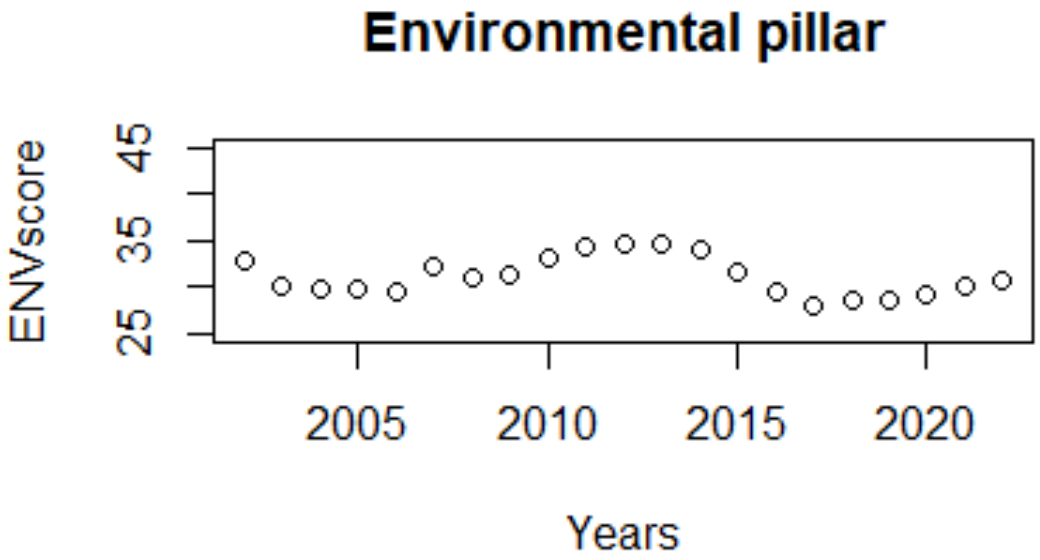
Graph 1: Mean ESG scores for all companies over time.



Graph 2: Mean social pillar scores for all companies over time.



Graph 3: Mean environmental pillar scores for all companies over time



Graph 4: Mean governance pillar scores for all companies over time.

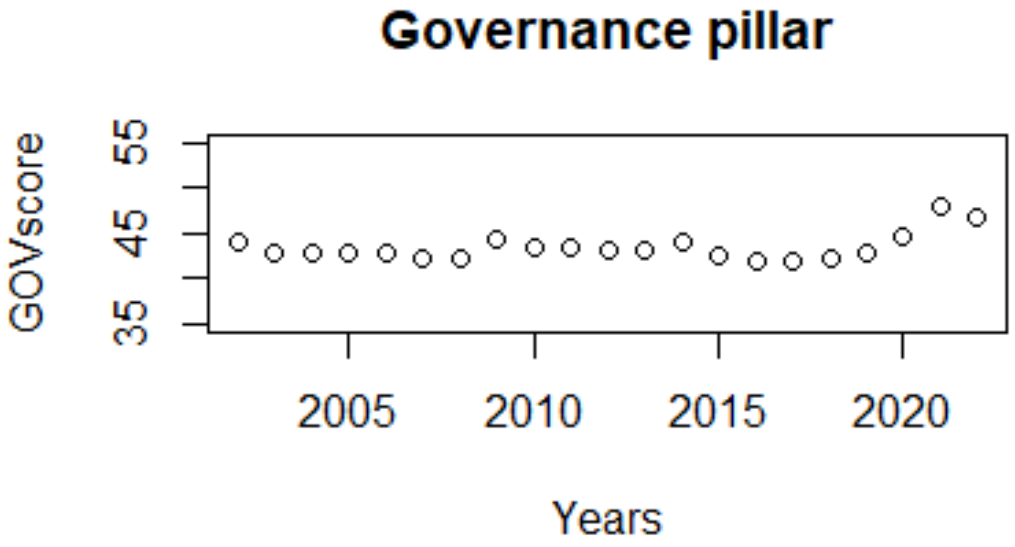


Table 8: Random effects model with return as dependent variable and lags included for overall ESG performance and the individual pillars.

	Dependent variable:			
	Return_win			
	(1)	(2)	(3)	(4)
ESG	0.0001			
	(0.001)			
ESG_lag	-0.0003			
	(0.002)			
ENV		-0.0001		
		(0.002)		
ENV_lag		-0.00001		
		(0.002)		
SOC			0.0004	
			(0.001)	
SOC_lag			0.0001	
			(0.001)	
GOV				0.0003
				(0.001)
GOV_lag				-0.0001
				(0.001)
Assets_win	0.0001	-0.00004	-0.0001	-0.0001
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	0.0001	-0.00004	0.00004	0.00004
	(0.0002)	(0.0005)	(0.0002)	(0.0002)
RD_win	0.0002	0.005	0.002	0.001
	(0.016)	(0.024)	(0.017)	(0.017)
Constant	0.059	0.053	0.041	0.051
	(0.073)	(0.088)	(0.068)	(0.071)
Observations	1,767	632	1,857	1,857
R^2	0.004	0.004	0.003	0.002
Adjusted R^2	0.001	-0.004	0.0001	-0.001
F Statistic	0.202	0.084	0.166	0.124

Note: $^{*}p<0.10$ $^{**}p<0.05$ $^{***}p<0.01$

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 9: Fixed effects regression with return as the dependent variable

	Dependent variable:			
	Return_win			
	(1)	(2)	(3)	(4)
ESG	-0.0003			
	(0.001)			
ENV		0.001		
		(0.0005)		
SOC			0.0005	
			(0.0004)	
GOV				0.0004
				(0.0003)
Assets_win	0.0002	-0.0001	0.00001	0.0001
	(0.0004)	(0.001)	(0.0004)	(0.0004)
DE_win	0.0001	0.0001	0.00004	0.00004
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
RD_win	0.009	0.013	0.009	0.009
	(0.011)	(0.013)	(0.010)	(0.010)
Observations	2,875	1,638	2,796	2,796
F Statistic	0.727	0.771	1.091	0.920

Note: $^{*}p<0.10$ $^{**}p<0.05$ $^{***}p<0.01$

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 10: Simple OSL regression with Return as the dependent variable

	Dependent variable:			
	Return_win			
	(1)	(2)	(3)	(4)
ESG	-0.0001			
	(0.0002)			
ENV		-0.0003*		
		(0.0002)		
SOC			-0.00004	
			(0.0002)	
GOV				-0.0002
				(0.0001)
Assets_win	0.00002	0.00000	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
DE_win	0.00004	-0.00002	0.00003	0.00003
	(0.00003)	(0.00005)	(0.00003)	(0.00003)
RD_win	0.0003	0.003	0.002	0.002
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	0.070***	0.071***	0.067***	0.075***
	(0.007)	(0.008)	(0.007)	(0.008)
Observations	3,782	1,870	3,288	3,288
R^2	0.001	0.002	0.001	0.001
F Statistic	0.620	1.053	0.519	1.042

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

*** The simple OLS equation contains firm indicators i, but no time indicators t.*

Table 11: Random effects model with Tobin's Q as dependent variable and lags included for overall ESG performance and the individual pillars.

	Dependent variable:			
	TOBQ_win			
	(1)	(2)	(3)	(4)
ESG	0.005**			
	(0.002)			
ESG_lag	0.0001			
	(0.002)			
ENV		0.005**		
		(0.002)		
ENV_lag		0.007***		
		(0.002)		
SOC			-0.001	
			(0.001)	
SOC_lag			0.004**	
			(0.001)	
GOV				0.001
				(0.001)
GOV_lag				-0.004***
				(0.001)
Assets_win	-0.012***	-0.008***	-0.007***	-0.007***
	(0.001)	(0.002)	(0.001)	(0.001)
DE_win	-0.001***	-0.0004	-0.001***	-0.001***
	(0.0003)	(0.001)	(0.0003)	(0.0003)
RD_win	0.300***	0.189***	0.153***	0.164***
	(0.028)	(0.041)	(0.027)	(0.027)
Constant	2.907***	2.393***	3.005***	3.200***
	(0.097)	(0.138)	(0.094)	(0.094)
Observations	2,904	989	2,938	2,938
R^2	0.095	0.078	0.073	0.067
F Statistic	186.626***	46.022***	84.040***	88.859***

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 12: Fixed effects regression with Tobin's Q as dependent variable.

	Dependent variable:			
	TOBQ_win			
	(1)	(2)	(3)	(4)
ESG	0.004**			
	(0.002)			
ENV		-0.003*		
		(0.002)		
SOC			-0.0001	
			(0.001)	
GOV				-0.001
				(0.001)
Assets_win	-0.007***	-0.002	-0.006***	-0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	-0.001***	-0.0004	-0.001***	-0.001***
	(0.0002)	(0.0003)	(0.0002)	(0.0002)
RD_win	0.021	-0.010	-0.007	-0.006
	(0.024)	(0.033)	(0.027)	(0.027)
Observations	6,131	3,019	5,260	5,260
R^2	0.020	0.004	0.015	0.016
F Statistic	24.928***	2.423**	16.677***	16.849***

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 13: Simple OLS with Tobin's Q as the dependent variable

	Dependent variable:			
	TOBQ			
	(1)	(2)	(3)	(4)
ESG	0.001			
	(0.001)			
ENV		0.003**		
		(0.001)		
SOC			0.005***	
			(0.001)	
GOV				-0.004***
				(0.001)
Assets	-0.012***	-0.009***	-0.011***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)
DE	-0.001***	-0.0002	-0.001***	-0.001***
	(0.0002)	(0.0003)	(0.0003)	(0.0003)
RD	0.250***	0.246***	0.242***	0.253***
	(0.014)	(0.017)	(0.016)	(0.016)
Constant	2.983***	2.544***	2.786***	3.108***
	(0.053)	(0.057)	(0.055)	(0.058)
Observations	6,131	3,019	5,260	5,260
R^2	0.087	0.086	0.075	0.075
F Statistic	145.030***	71.034***	107.126***	106.655***

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

** The simple OLS equation contains firm indicators i, but no time indicators t.*

Table 14: Random effects model with EPS as dependent variable and lags included for overall ESG performance and the individual pillars.

	Dependent variable:			
	EPS_win			
	(1)	(2)	(3)	(4)
ESG	0.008***			
	(0.003)			
ESG_lag	0.019***			
	(0.003)			
ENV		0.003		
		(0.003)		
ENV_lag		0.006**		
		(0.003)		
SOC			0.001	
			(0.002)	
SOC_lag			0.006***	
			(0.002)	
GOV				-0.0001
				(0.002)
GOV_lag				0.001
				(0.002)
Assets_win	0.005***	0.009***	0.010***	0.011***
	(0.001)	(0.002)	(0.001)	(0.001)
DE_win	0.001	0.0003	0.001***	0.001***
	(0.0005)	(0.001)	(0.0005)	(0.0005)
RD_win	0.020	0.006	-0.033	-0.021
	(0.034)	(0.047)	(0.036)	(0.036)
Constant	0.406***	0.947***	0.835***	1.076***
	(0.135)	(0.166)	(0.133)	(0.140)
Observations	1,454	624	1,490	1,490
R^2	0.112	0.146	0.128	0.119
F Statistic	221.806***	96.425***	206.701***	196.435***

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 15: Fixed effects regression with EPS as dependent variable.

	Dependent variable:			
	EPS_win			
	(1)	(2)	(3)	(4)
ESG	0.006***			
	(0.002)			
ENV		0.002		
		(0.002)		
SOC			0.003**	
			(0.002)	
GOV				0.003**
				(0.001)
Assets_win	0.004***	0.006***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
DE_win	0.0003	0.0005	0.001***	0.001***
	(0.0003)	(0.0004)	(0.0003)	(0.0003)
RD_win	0.071**	-0.018	0.051*	0.051*
	(0.028)	(0.040)	(0.029)	(0.029)
Observations	3,291	1,966	2,799	2,799
R^2	0.027	0.021	0.037	0.037
F Statistic	18.295***	8.281***	21.395***	21.465***

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

Table 16: Simple OLS with EPS as the dependent variable.

	Dependent variable:			
	EPS			
	(1)	(2)	(3)	(4)
ESG	0.013***			
	(0.002)			
ENV		0.002		
		(0.002)		
SOC			0.008***	
			(0.001)	
GOV				0.005***
				(0.001)
Assets	0.003***	0.005***	0.006***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)
DE	0.001	0.002***	0.002***	0.002***
	(0.0004)	(0.0005)	(0.0004)	(0.0004)
RD	-0.004	-0.007	-0.031*	-0.023
	(0.015)	(0.019)	(0.016)	(0.016)
Constant	0.962***	1.285***	0.934***	1.029***
	(0.067)	(0.072)	(0.066)	(0.071)
Observations	3,291	1,966	2,799	2,799
R^2	0.077	0.084	0.103	0.096
F Statistic	68.249*** (df = 4; 3286)	45.160*** (df = 4; 1961)	80.131*** (df = 4; 2794)	74.107*** (df = 4; 2794)

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

**A firm's total assets and R&D expenditure have been divided by 100,000 to limit the gap in comparability between the dependent, independent and control variables.*

** The simple OLS equation contains firm indicators i, but no time indicators t.*