How does ESG performance affect market valuation? Evidence for S&P 500 listed firms during 2013 – 2019.

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Abstract

During the last decades the question was raised if ESG engagement only provides reputational or even also financial advantages. This paper aims to analyse how ESG performance of S&P 500 listed firms impacts market valuation, measured by the Tobin's Q ratio, during a study period of 2013 – 2019. In contrast to other literature, it finds that higher ESG performance decreases market valuation, as indicated by the slightly negative significant relationship. In order to investigate to which kinds of firms this effect is attributable to this study conducts a subsample analysis with six groups of firms. Therefore, the data sample is divided into three categories each generating a group exceeding or underperforming the mean of Company size, Leverage and ESG Rating. When examining the mean and regression results of these subsamples the researcher finds negative relationships for all of them but only the ones for smaller Company size, lower Leverage and worse ESG rating were significant. This suggests that the firms with smaller size, a lower degree of leverage and inferior rated ESG commitment are the main factors influencing how ESG performance affects market valuation. This outcome provides relevant insights for policy makers, managers, investors and firms' stakeholders, by assisting them in their decision making.

Keywords: ESG performance, Market value, Tobin's Q, US S&P 500, Panel data, Subsamples Firm size, Leverage

Como é que o desempenho do ESG afecta a avaliação do mercado?

Evidência para empresas cotadas no S&P 500 durante 2013 - 2019.

Johanna-Luise Pontani

Abstrato Português

Durante as últimas décadas, a questão levantada foi a de saber se o envolvimento da ESG apenas proporciona vantagens reputacionais ou mesmo financeiras. Este documento visa analisar como o desempenho do ESG das empresas cotadas no S&P 500 tem impacto na avaliação do mercado, medido pelo rácio Q de Tobin, durante um período de estudo de 2013 - 2019. Em contraste com outra literatura, verificou-se que um desempenho mais elevado dos ESG diminui a avaliação do mercado, como indicado pela relação significativa ligeiramente negativa. A fim de investigar a que tipos de empresas este efeito é atribuível a este estudo, efectua-se uma análise de subamostra com seis grupos de empresas. Assim, a amostra de dados é dividida em três categorias, cada uma gerando um grupo que excede ou tem um desempenho inferior à média da dimensão da empresa, alavancagem e ESG Rating. Ao examinar a média e os resultados de regressão destas subamostras, os investigadores encontraram relações negativas para todas elas, mas apenas as de empresas de menor dimensão, menor Alavancagem e pior classificação ESG foram significativas. Isto sugere que as empresas de menor dimensão, um menor grau de alavancagem e um compromisso ESG de classificação inferior são os principais factores que influenciam a forma como o desempenho do ESG afecta a avaliação do mercado. Este resultado proporciona conhecimentos relevantes aos decisores políticos, gestores, investidores e partes interessadas das empresas, ajudando-os na sua tomada de decisões.

Palavras-chave: Desempenho do ESG, Valor de mercado, Tobin's Q, US S&P 500, Dados do painel, Subamostras Tamanho da empresa, Alavancagem

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1. Introduction

In the wake of the 2008 financial crisis, stakeholders' trust was severely diminished and the requirement for regulation and transparency of business data and procedures greatly increased. Therefore, global authorities introduced a variety of institutional reforms to improve corporate governance (Velte, 2017; Abrams et al., 2021). This spurred global businesses to move away from a sole focus on short-term financial returns and shareholder value toward a more sustainable management approach that takes into account interests of multiple stakeholder groups. In his work Pucker (2021) emphasizes that "what gets measured, gets done", which is in keeping with a more thorough analysis of corporate performance in order to raise the level of dedication to ESG engagement.

Sustainable investment has been continuously growing over the past few years – even doubling to $51.1 billion from 2019 to 2020 (Hale, 2021). This suggests that the topic has garnered a lot of interest from both businesses and investors. The question therefore arises whether ESG engagement involves benefits which are not merely social or reputational. Several studies conduct further research and analyse whether ESG performance might enhance firm valuation (Fatemi et al., 2018), or even financial or operational performance (Bansal et al., 2021; Ionescu et al., 2019).

The ongoing debate regarding these results in the literature shows that this relationship can be positive, negative or even neutral, identified as the main three research streams by Bansal et al. (2021). The positive correlation finds its justification in the stakeholder and value creation theory indicating that companies focusing on ESG performance obtain competitive advantages in the market and can generate financial and economic gains resulting in increased market valuation. The second research stream suggests a negative correlation and bases its results on shareholder theory, defining a business's sole purpose to maximize financial capital, but also on several theorems (trade-off, cost-of-capital, agency costs, etc.) that involve higher costs or even a decrease in abnormal returns in order to increase ESG performance. The least common research stream is the third one which indicates that there is no significant relationship between ESG performance and market valuation.

Most of the prior literature finds positive associations, such as Ademi and Klungseth (2022), Chelawat and Trivedi (2016), Li et al. (2018), Bansal et al. (2021), Brooks and Oikonomou (2018) whereas only a few studies are able to prove a negative significant relationship (Brammer et al., 2006; Marsat and Williams, 2011; Jha and Rangarajan, 2020). However, the

studies of the last few years still present contractionary outcomes and provide incentives for further research.

Therefore, this study's main objective is to ascertain if firms' ESG performance significantly impacts market valuation for companies listed on the S&P 500 index within a study period of 2013 until 2019. In order to measure the dependent variable, firms' market valuation, the paper applies the Tobin's Q ratio (TQ) whereas the independent variable, ESG performance, is represented by Refinitiv DataStream's ESG scores (ESGP). The used timeframe aims to include a large period but to leave out relevant crises like the financial crisis or the COVID-19 pandemic.

This paper conducts a multiple regression investigation applying Firm size (SIZE), measured by the natural logarithm of the number of employees, Debt-to-Equity ratio (DE) and Total Asset Turnover (TAT) as control variables (Bansal et al., 2021; Alareeni and Hamdan, 2020; Ademi and Klungseth, 2022).

For further analysis, this study aims to investigate what exactly caused the results of the main regression and thereby contribute to the literature by analysing the regression and mean results of six subsamples. To accomplish this, the paper applies an approach of Alareeni and Hamdan (2020) rudimentarily. The subsamples are generated by dividing the main dataset by the median of the following categories: *Company size* per year, degree of *Leverage* per year and *ESG Rating* within each industry per year. By examining the mean and regression results for these subsamples the paper is able to determine results about the significance of the impact of ESG performance on market valuation with reference to certain kinds of firms. This study may then be able to ascertain which types of S&P 500 listed companies between 2013 and 2019 – either the ones with assets, leverage and ESG performance *above* or *below* the mean – are causing the impact of ESG engagement on market valuation.

In contrast to the majority of the prior research in this area, this work finds a negative significant correlation result for the relationship between ESG performance and market valuation (TQ) in the main regression model. According to the subsample analysis, it also obtaines significant results for the impact of ESG engagement on market valuation for the subsamples of firms with lower assets, lower leverage and lower ESG performance. This allows the study to draw the conclusion that companies with smaller assets, lower debt, and inferior ESG scores are responsible for the negative connection between ESGP and TQ, discovered in every subsample. Though this is only partially what was anticipated, it presents an insight for policy makers, managers and investors. An increase in knowledge concerning which firms most affect the

relationship of ESG performance and market valuation might assist scholars, market participants, firms' stakeholders and regulators in their decision making.
The remainder of the paper is organised as follows: In the next section the relevant literature is reviewed, and hypotheses are developed. Section 3 explains the research methodology as well as the data sample. Sections 4 and 5 present the results and limitations as well as scope for further research. Finally, section 6 offers a summary and concluding remarks.

2. Literature Review and Hypothesis development

The research question of how the market valuation of firms is affected by their ESG performance is explored by several studies and therefore is the subject of contentious debate. Most of the literature applies the ESG scores estimated by platforms like Thomson Reuters, Bloomberg or MSCI in order to express firms' ESG performance and the Tobin's Q ratio to indicate the respective firms' market valuation. Consequently, this paper also follows that approach and uses ESG scores (ESGP) from Thomson Reuters as well as the Tobin's Q Ratio (TQ).

Neoclassical theory suggested that the relationship between firms' ESG engagement and its market valuation has consistently been negative, meaning allocating resources to sustainable purposes just implicates additional cost (Palmer et al., 1995). However, recent studies also prove a positive correlation (Fatemi et al., 2018; Ademi and Klungseth, 2022). As the results of the literature appear to be contractionary, it is conceivable to follow the theory of Brooks and Oikonomou (2018) supposing that this relationship might change over time.
Bansal et al. as well as other papers identify three research streams in this debate, each of them suggesting a different kind of relationship: positive, negative, or non-significant.
In the first research stream of a **positive** correlation many works base their results on the stakeholder as well as value creation theory. According to the definition of Freeman (2010), *stakeholder theory* implies that the primary goal for a company, in order to succeed, is to serve the interests of its stakeholders, who might be linked parties such as consumers, employees, or investors. This course of action might enhance ESG performance, but it is especially likely to generate financial and economic gains, leading to a significant increase in market value (Ionescu et al., 2019). Businesses that focus on ESG have been shown to benefit from strong management skills and an outstanding reputation, leading to the trust of stakeholders such as

customers, employees, and investors. This trust is rewarded with increased loyalty, productivity, and investment (Li et al., 2018; Schuler and Cording, 2006).
Additionally, a positive correlation between ESG performance and market valuation is also supported by the *value-creation theory*, which implies, similarly, that firms with productive corporate sustainability efforts create not only social but also financial value and therefore gain competitive advantages in the market (Bansal et al., 2021). Several studies, such as Ademi and Klungseth (2022), Aouadi and Marsat (2018), Chelawat and Trivedi (2016), Fatemi et al. (2018) and Minutolo et al. (2019), discover a positive relationship between firms' ESG performance or Corporate Sustainability Performance (CSP) and market valuation, predominantly basing their results on the above-mentioned theories.

On the contrary, the second research stream involves many studies like Brammer et al. (2006), Marsat and Williams (2011) and Jha and Rangarajan (2020) finding a **negative** correlation of the mentioned factors. Often their results are grounded on theorems like shareholder theory or several cost-related theories such as cost-of-capital reduction, the trade-off or the agency-cost theory. When Friedman (1970) proposed the *shareholder theory*, he defined the sole purpose and social responsibility of a business as the maximization of economic capital, which stands in strong contrast to the aforementioned goal of stakeholder theory (Jha and Rangarajan, 2020). In order to prioritize shareholders' interests, companies should, according to Friedman, aim to increase financial market value, rather than focusing on increasing sustainable practices. Moreover, investing in ESG activities usually involves a considerable amount of costs, which can result in detrimental consequences for a firm's market value *(cost-of-capital theory)*. Companies must also consider the highly increasing opportunity cost of ESG investments, when allocating more resources for sustainability. Social expenditures would have to compete for the same available budget and therefore would generate a trade-off for managers *(Trade-off theory)* (Bansal et al., 2021). Research papers like Schuler and Cording (2006) additionally base their negative results on the *agency cost theory*, which denotes that managers may pursue ESG practices for their own benefit, as they have knowledge of shareholders' difficulty in monitoring their own behaviour. Management might overinvest in social purposes for reputational reasons and thereby incur operational costs on the expense of shareholders (Buchanan et al., 2018, Ademi and Klungseth, 2022). This suggests that when executives allocate resources towards sustainable projects, they are not using those resources to their greatest potential, which could lead to a decline in financial or market value as well as to a negative correlation between ESG performance and market valuation (Schuler and Cording, 2006; Gillan et al., 2021). Another

theory of Fisher-Vanden and Thorburn (2011) provides an additional explanation for that negative relationship. The study shows that firms investing in sustainability activities have to bear additional costs that might outweigh profits and are therefore punished by investors, possibly leading to negative *abnormal returns*.

The third research stream defined by Bansal et al. (2021) involves ESG performance having **no significant effect** on market valuation at all. In this context studies like Junius at al. (2020) or Fauzi et al. (2007) find that firms' market valuation and their engagement in sustainable activities like ESG are not significantly correlated with each other after all. Additionally, Atan et al. (2018) discovers that the total ESG score as well as the individual components do not present a significant relationship.

Besides these three research streams the literature also examines the various aspects of the ESGP-TQ relationship with distinct techniques. Many papers analyse the effect ESG performance has on market valuation, but they also investigate the additional effects ESG engagement has on financial and operational performance, which is typically gauged by Return on Equity (ROE) and Return on Assets (ROA) (Buallay et al., 2019; Hamdan et al., 2017; Alareeni and Hamdan, 2020; Ionescu et al., 2019). The results of these studies provide predominantly positive results for the correlation of the combined ESG performance but mixed results if the effects are separated into the individual components of the ESG Score.
Moreover, previous research estimates the correlation between ESG engagement and corporate financial performance, using either market-based measures like TQ as in this study) or accounting-based measures, measured by ROA as suggested by Velte (2017), Jha and Rangarajan (2020) and other studies. Their results differentiate from each other in such a way that Velte (2017) finds a positive association of ESG and ROA but a non-significant for TQ, whereas Jha and Rangarajan (2020) finds an insignificant negative correlation for both. Like Jha and Rangarajan (2020), Behl et al. (2021) evaluates the corporate financial performance connection to ESG performance but, additionally, also tests the data for bidirectional causality. Both works find no bidirectional relationship or causality.

Many studies analyse the connection between ESG performance and Tobin's Q in different contexts. For example, Yoon et al. (2018), Wong et al. (2021), Junius et al. (2020), Bansal et al. (2021), Jha and Rangarajan (2020), and Behl et al. (2021) study this relationship in emerging economies such as Indonesia, India, Singapore, Thailand, Malaysia, and Korea. Other works,

like Ionescu et al. (2019) and Buallay (2019), focus on specific industries such as tourism and banking, respectively. Additional previous research, such as Brammer et al. (2006) and Landi and Sciarelli (2019), Marsat and Williams (2011), finds a negative relationship between firms' ESG investments and their stock returns, indicating that good sustainable performance is not rewarded financially.

Considering the prior literature this work aims to contribute not only by analysing the relationship of ESG performance and market valuation for the mentioned dataset and unique study period but also by delving deeper to identify the origin or cause of results. Therefore, in addition to the primary regression, this study divides the dataset into six subsamples in order to perform a mean and multiple regression analysis, partially following Alareeni and Hamdan's (2020) path analysis. The subsamples considering Company size and Leverage were created by dividing the data into two groups of firms respectively, being below and above the median. Regarding ESG Rating this study took the median of every industry's ESG scores per year and divides the sample similarly like the two subsamples before. A mean and regression analysis of all mentioned subsamples is conducted examining the connection between ESG performance and market valuation.
Regarding the main regression as well as the subsample regression analyses the following hypotheses are developed:

H1: Firms' ESG performance significantly affects their market valuation, measured by the Tobin's Q ratio.

H2: The effect of ESG performance on market valuation is depending on each firms' Company size, which is measured by the number of total assets.
H3: The effect of ESG performance on market valuation is depending on the firms' degree of Leverage, which is measured by the ratio of total debt and total assets.
H4: The effect of ESG performance on market valuation is depending on the firms' ESG Rating, which is measured by the ESG scores of Refinitv DataStream.

3. Data and Methodology

3.1 Data Sample

In order to properly test the impact of companies' ESG performance (ESGP) on their market valuation, measured by Tobin's Q (TQ) the paper collects annual data of firms listed on the S&P500 index from the Refinitiv DataStream database. To exclude any outliers attributable to either the financial crisis and its consequences or the COVID-19 pandemic as well as in order to ensure a greater availability and quality of ESG information (Ademi and Klungseth, 2022) this study chooses to collect data at the end of each fiscal year for a time frame of 2013 – 2019. As in the work of Bansal et al. (2021), the data set excludes all companies that were not included in the S&P 500 for the full period of 2013–2019 and those that did not provide data for each of the variables in each year. This leads to a balanced sample consisting of 2,107 observations for 301 firms.

The S&P 500 index is a yearly updated stock market index that represents the 500 largest companies in the United States weighted by market capitalization. As in other studies, this index is selected since it includes the biggest firms globally which provide a very high level of ESG disclosure and are evaluated by leading ESG rating agencies (Ademi and Klungseth, 2022). All companies bundled in the data collection are divided into different industries which are defined by the Industry Classification Benchmark (ICB). The ICB, developed by Dow Jones and the Financial Times Stock Exchange (FTSE), is a global system of categorization to assign public companies to respective industry sectors based on their major source of revenue. It contains 11 industries which are split into 20 supersectors, 45 sectors and ultimately 173 subsectors. This system is used by stock exchanges worldwide in order to help investors identify competitors and compare trends between specific industries (FTSE Russell, 2022; Kenton, 2022). Applying the supersector level, this study divides the dataset into 19 industries. The category "Banks" has been removed, as there are no firms with this sector allocation. An overview of the respective industries and attributable companies is shown in Table 8.

Table 8: Industry Classification Code (ICB)

Code	Industry (Supersector level)	Number of firms attributable to
1010	Technology	34
1510	Telecommunications	8
2010	Health Care	34
3020	Financial Services	6
3030	Insurance	2
3510	Real Estate	6
4010	Automobiles and Parts	5
4020	Consumer Products and Services	18
4030	Media	7
4040	Retail	18
4050	Travel and Leisure	12
4510	Food, Beverage and Tobacco	19
4520	Personal Care, Drug and Grocery Stores	10
5010	Construction and Materials	5
5020	Industrial Goods and Services	54
5510	Basic Resources	6
5520	Chemicals	8
6010	Energy	23
6510	Utilities	26

3.2 Data Collection and Variables

This paper contributes to the literature through an analysis of the impact ESG performance (ESGP) has on market valuation, measured by Tobin's Q (TQ), of S&P 500 listed companies during 2013-2019.

In addition, this study distinguishes itself by attempting to assess for which groups of firms this effect might be strongest. Therefore, total data are divided into subsamples and an additional mean and regression analysis is conducted with those samples. For the separation procedure, this study applies three subsample categories. Each category separates the data into two groups of firms exceeding or remaining below the median of this category. The categorizations are specified as *Company size* measured by number of total assets per year, degree of *Leverage* estimated by the ratio of total debt and total assets per year and ultimately *ESG Rating per industry* computed by the industry median of ESG scores per year.

For the main analysis of the impact ESG performance has on market valuation this study collects data for each of the regression variables from the Refinitiv DataStream platform, which

presents an industry-leading analytic tool providing 120 years of data across 175 countries and therefore enables an in-depth examination of connections between data series (Refinitiv, 2022). All the dependent, independent and control variables as well as other terms used in this study are outlined and defined in Table 1.

In order to test the declared hypotheses and estimate the impact of firms' ESG performance on their market valuation this study defines Tobin's Q as **dependent variable**. Tobin's Q represents a proxy for the market valuation of the analysed companies. Commonly used in the literature, the Tobin's Q describes the ratio of a firm's market value divided by its replacement cost (Lindenberg and Ross, 1981). However, as it is hard to properly evaluate the replacement cost of a company's assets this study uses the approximation approach of Bansal et al. (2021) to calculate appropriate values for the Tobin's Q ratio. This approximation implies adding together current liabilities with market value of share capital and dividing it by the total assets of the firm (Bansal et al., 2021). The Tobin's Q presents a unit-free variable as it has no defined range of what maximum or minimum values it can take. It is common knowledge, based on the results of prior research (Rolle et al., 2020; Hayes, 2021), that if a firm's Tobin's Q ratio is higher than 1, it is likely that the stock is overvalued, as this ratio is greater than the replacement cost of the firm's assets. Consequently, a ratio below 1 would suggest that the market or company is undervalued.

Following Velte (2017) this paper measures the **independent variable**, ESG performance, as Companies' ESG scores retrieved from the Refinitiv DataStream platform of Thomson Reuters. Like many recent works in this field, this paper applies these scores as an indication of the level of ESG engagement or performance, although there might be other relevant company-related factors that are not considered in the ESG Score. Refinitiv evaluates the ESG score, in particular a firm's ESG performance, its commitment, and effectiveness, across 10 main categories, based on considerations such as comparability, impact, data availability, and industry relevance and might differ by industry. These categories are assigned to the different components of the ESG Score and are shown in Figure 1. Being normalized to a percentage between 0 and 100, the ESG score applies industry-specific weights for both the Environmental and Social pillars but a standard weight for the Governance category.

In contrast to other databases Refinitiv also provides another important ESG measure, the Combined ESG score, which represents a company's ESG performance, adjusting for possible ESG controversies of the respective company (see Figure 1). The score gives a broad overview of an organization's ESG performance, based on the data relating to the ESG components and any controversies that were reported in the news media worldwide and associated with the firm

(Refinitiv, 2020). This paper might also test if the Combined ESG Score impacts the market valuation differently than the standard ESG score.

All of these ESG related variables are obtained from the database Refinitiv DataStream which is part of the Thomson Reuters platform. Refinitiv, next to MSCI, Bloomberg and others, is one of the most comprehensive sources for ESG scores and research data in the worldwide market. It covers 80% of the global market capitalisation and utilizes over 450 different ESG metrics as well as a data history dating back to 2002. As a primary source of information, Refinitiv utilizes publicly reported data from company and NGO websites, annual reports, stock exchange filings, CSR reports and several news sources. The platform refreshes and recalculates their products on a weekly basis.

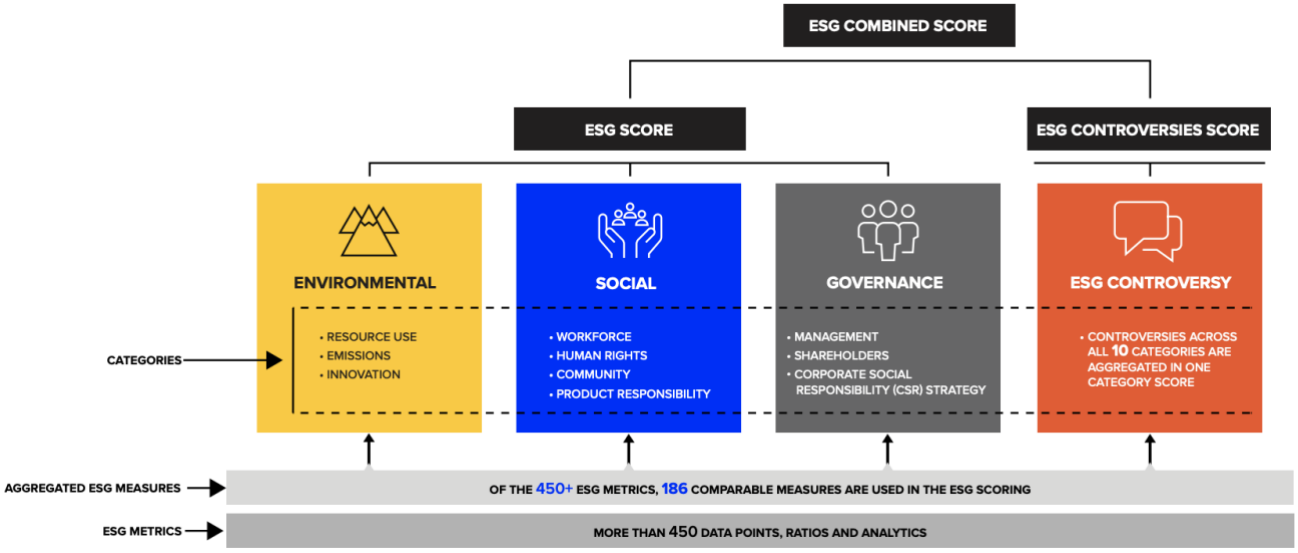

Figure 1 (Source: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf.)

Refinitiv uses both automated and manual collection methods to ensure the highest level of data accuracy. These methods include integrating error check logics into the data collection tool, automating quality check screeners, conducting daily independent audits, and applying system validation checks based on their knowledge and insights.

In order to perform optimal regression results this study determines three **control variables**, which are commonly used in prior literature (Bansal et al., 2021; Alareeni and Hamdan, 2020; Ademi and Klungseth, 2022). The first one, Firm size (SIZE), is measured by the number of employees in each company. To generate a model with more linearity and better results this study logarithmises these values of firms' number of employees. The other two control variables present each firm's Debt-to-Equity ratio (DE) and as the Total Asset Turnover (TAT) of every business.

After collecting the market and accounting data for the dependent, independent as well as the control variables from Refinitiv DataStream it is necessary to validate and clean them in order to come up with an accurate and balanced dataset. Data like the company's share prices and the number of employees are reconciled with their respective values on Yahoo Finance, Macrotrends and the annual reports. Additionally, all firms that were not in the S&P 500 for the entire timeframe of 2013-2019, and those that did not provide data for each of all the variables in every year, are excluded from the data set. Ultimately, the study's data collection consists of 301 observations per year and 2,107 observations in total.

Label	Name	Description
Dependent Variables		
TQ	Tobin's Q	In this study the Tobin's Q ratio defines the market valuation of a company, it is calculated by TQ = $\frac{Market\ Value + Current\ liabilities}{Total\ Assets}$
Independent Variables		
ESGP	ESG Performance	ESG Scores retrieved from Refinitiv DataStream platform
Control Variables		
SIZE	Firm size	Natural logarithm of Number of Employees per year
DE	Debt/Equity	D/E = $\frac{Total\ Debt}{Equity}$
TAT	Total Asset Turnover	TAT = $\frac{Total\ Revenue}{Total\ Assets}$
Subsample categories		
	Company size	Median of total assets per year
	Leverage	Median of D/A = $\frac{Total\ Debt}{Total\ Assets}$ per year
	ESG Rating	Median of ESG scores per industry per year

Table 1: *Description and summary of variables and other used terms*

3.3. Method and Regression Model

In line with prior literature (Ademi and Klungseth, 2022; Fatemi et al., 2018, Velte, 2017; Bansal et al., 2021) this study measures the causal relationship between ESG performance (Refinitiv ESG Scores) and market valuation (Tobin's Q) by analysing several entities, 301 firms, across multiple time periods, from 2013 until 2019, using panel data regression models. Panel data regressions enable the researcher to process both cross-sectional and time-series data. They also control for variables that vary over time but not within entities or control for the ones that differ across entities but remain constant over time (Chelawat and Trivedi, 2016). In order to capture this variation as well as to control for heterogeneity across years and companies this study includes time-fixed effects and firm-fixed effects, respectively (Bansal et al., 2021). Additionally, this might reduce collinearity (Ademi and Klungseth, 2022).
As the data were cleaned to only contain firms that provide full data for every variable and time period the sample can be termed a balanced dataset. This study uses STATA 17 in order to perform the following regression equation:

$$TQ_{it} = \alpha_0 + \beta_1 ESGP_{it} + \beta_2 SIZE_{it} + \beta_3 DE_{it} + \beta_4 TAT_{it} + \omega_i + \gamma_t + \varepsilon_{it}$$

where TQ = Tobin's Q ratio, presenting a proxy for market valuation
ESGP = ESG performance, measured by ESG scores of Refinitiv DataStream
SIZE = Firm size, measured by log (number of employees per year)
DE = Debt-to-Equity ratio per year
TAT = Total Asset Turnover per year
ω_i = Firm-fixed effects
γ_t = Time-fixed effects

In order to identify what types of firms caused the impact of ESG performance on Tobin's Q this study conducts six subsample regressions containing data of firms with Company size, Leverage and ESG Rating below or above the mean. This study applies the following regression formula:

$$TQ_{it} = \alpha_0 + \beta_1 ESGP_{it} + \beta_2 SIZE_{it} + \beta_3 TAT_{it} + \omega_i + \gamma_t + \varepsilon_{it}$$

where TQ = Tobin's Q ratio, presenting a proxy for market valuation

ESGP = ESG performance, measured by ESG scores of Refinitiv DataStream

SIZE = Firm size, measured by log (number of employees per year)

TAT = Total Asset Turnover per year

ω_i = Firm-fixed effects

γ_t = Time-fixed effects

4. Results

4.1 Results main regression model

4.1.1 Descriptive Statistics of main regression model

This study provides an overview of the descriptive statistics for all variables. Therefore, Table 2 includes mean, standard deviation, Minimum and Maximum for the dependent variable, the independent as well as the control variables. Considering the dependent variable, market valuation, resembled by Tobin's Q (TQ), the mean lies at 2.035 and it generally ranges between a value of 0.236 and 13.355. The smallest Tobin's Q ratio provides Warner Bros Discovery Inc in 2017 whereas the greatest is displayed by Verisign, incorporated in 2019. The mean values of Tobin's Q show a decrease between 2013 and 2015, followed by a rise between 2016 and 2018 and finally display a surge to its highest mean in 2019. Thus, it might be inferred that the market valuation of enterprises has a reasonably constant slope.

When looking at the independent variable, ESG performance (ESGP), the sample includes firms with a minimum ESG score of 6.57 and a maximum of 93.28 as well as a mean of 60.445. The highest score (93.28) was achieved by Microsoft Corporation in 2018 whereas the lowest (6.57) was reached by Netflix Inc in 2013. From this development one could assume that during the study period of 2013 until 2019 firms took a deeper focus on sustainability and allocated more resources to ESG activities. For the Firm size variable (SIZE), measured by the natural logarithm of number of employees, the mean value is 10.222. This variable ranges between a minimum of 4.394, for Pinnacle West Capital Corporation in 2013, and a maximum of 14.648, for Walmart Inc in 2017. The results show that the Debt-to-Equity variable (DE) has the widest range between its minimum and maximum values, which are -263.458 for Allegion PLC in 2014 and 264.722 for Bath & Body Works Inc in 2014 respectively. Its mean value for the total study period is 0.657. Ultimately, the values for the Total Asset Turnover variable (TAT)

present a mean of 0.832 as well as range between a minimum of 0.030 for Intercontinental Exchange Inc in 2013 and a maximum of 5.55 in 2014 for AmerisourceBergen Corporation.

This study also aims to examine the descriptive statistics throughout the study period (see Table 7). Accordingly, the mean values of ESG performance and Firm size are observed to be steadily rising whereas their standard deviations are mostly decreasing. The mean values for Tobin's Q show a relatively stable slope from 1.937 (2015) to 2.166 (2019), whereas the average Total Asset Turnover values present a slight decrease from 2013 (0.890) until 2019 (0.77). Regarding the Debt-to-Equity variable, the results show lower mean values for 2014 (0.1596) and 2019 (0.2157) than for all other years.

Table 2

	Mean	SD	Min	Max
TQ	2.035	1.591	0.236	13.355
ESGP	60.445	17.005	6.57	93.28
SIZE	10.222	1.366	4.394	14.648
DE	0.657	12.847	-263.458	264.722
TAT	0.832	0.666	0.030	5.55

Table 7: Yearly descriptive statistics of main regression model

	Mean	SD	Min	Max
2013				
TQ	2.02	1.56	0.35	13.0
ESGP	54.3	18.8	6.57	92.3
SIZE	10.1	1.39	4.39	14.6
DE	0.68	2.87	-35.7	16.2
TAT	0.89	0.72	0.030	4.65
2014				
TQ	2.10	1.59	0.36	12.5
ESGP	55.2	18.0	11.2	92.4
SIZE	10.2	1.38	4.42	14.6
DE	0.16	26.2	-263.5	264.7
TAT	0.89	0.70	0.040	5.55
2015				
TQ	1.94	1.53	0.25	12.5
ESGP	58.3	17.1	11.0	92.8
SIZE	10.2	1.38	4.53	14.6
DE	0.76	7.78	-82.3	60.4
TAT	0.83	0.66	0.050	4.90
2016				
TQ	1.94	1.32	0.27	7.70
ESGP	61.0	16.3	15.6	91.3
SIZE	10.2	1.36	4.49	14.6
DE	1.54	8.14	-74.8	65.0

TAT	0.81	0.65	0.050	4.36
2017				
TQ	2.14	1.63	0.24	10.9
ESGP	63.3	15.4	20.1	91.8
SIZE	10.2	1.36	4.50	14.6
DE	0.47	8.56	-109.6	31.3
TAT	0.80	0.64	0.050	4.34
2018				
TQ	1.95	1.61	0.24	10.4
ESGP	64.8	14.9	19.9	93.3
SIZE	10.3	1.36	4.56	14.6
DE	0.78	5.54	-62.4	40.8
TAT	0.83	0.66	0.060	4.46
2019				
TQ	2.17	1.85	0.25	13.4
ESGP	66.2	14.2	22.5	93.0
SIZE	10.3	1.36	4.57	14.6
DE	0.22	15.2	-235.6	67.1
TAT	0.77	0.61	0.060	4.58

4.1.2 Correlation results of main regression model

Table 3 presents the correlation matrix for dependent, independent and control variables testing the relationships among themselves. The results show that Tobin's Q (TQ) is significantly negatively linked with every variable except the Total Asset Turnover (TAT), which may come from them sharing a similar denominator. For the ESG Performance variable (ESGP) this study only finds one significant correlation (0.329) indicating a positive relationship to the Firm size variable (SIZE), measured by the natural logarithm of number of employees. As with prior research papers (Fatemi et al., 2018) this study also presents correlation values of the independent and control variables ranging below 0.5 which one can consider a low connection and therefore a good initial basis for this analysis. The highest value is the relationship between Firm size and Total Asset Turnover, but even this is only 0.330.

Similar to prior studies, these correlation results demonstrate that there is only a very weak association between Tobin's Q and ESG performance. In this work, the variables exhibit a negative correlation (-0.092), which is, however, so near to zero that the difference to previously established values is not very high.

Table 3: Correlation results for main sample

	TQ	ESG	SIZE	DE	TAT
TQ	1				
ESGP	-0.092***	1			
SIZE	-0.064***	0.329***	1		
DE	-0.045**	0.028	0.019	1	
TAT	0.213***	-0.011	0.330***	-0.012	1

p in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.1.3 Results of full sample regression

After conducting the descriptive as well as the correlation analysis, this paper performs a regression analysis in order to test the impact of ESG performance (ESGP), estimated by firms' ESG scores of Refinitiv DataStream, on firms' market valuation, measured by Tobin's Q (TQ). As shown in Table 4 this study first examines the relationship of solely ESG performance and Tobin's Q (1), then adds year fixed effects (2) and ultimately tests the main regression model by adding all control variables (3). The main model (3) includes the Tobin's Q as dependent variable, the ESG performance as independent variable as well as Debt-to-Equity (DE), Firm size (SIZE), measured by the natural logarithm of number of employees, and Total Asset Turnover (TAT) as control variables. In this main model (3), the R-squared amounts to 0.0686 indicating that the independent and control variables explain 6.86% of the variance of Tobin's Q. This value is significantly higher than the R-squared (0.0084) of the model (1) which considers Tobin's Q and ESG performance as only variables or even the R-Squared result (0.0128) of the model (2) year fixed effects are added to. One may infer that the main regression (3) is significantly more compatible with earlier work (Alareeni and Hamdan, 2020; Ademi and Klungseth, 2022) and delivers more applicable beta values attributable to more similar results for R-squared as well as homogenous control variables.

It is important for the analysis to mention, that the Tobin's Q presents a unit-free variable and has no defined range in terms of what maximum or minimum values it can take. The literature characterizes the Tobin's Q as a ratio which analyses if a company or the market is over- or undervalued by taking a value above or below one, respectively (Rolle et al., 2020; Hayes, 2021). Consequently, if Tobin's Q has a value near to one, even a minor change brought on by the independent variable may be highly important.

Keeping the effects of all other variables constant, the coefficient of each variable displays its influence on the prediction of the Tobin's Q ratio. Against this, the p-values demonstrate the significance of influence the independent and control variables have on forecasting Tobin's Q.

Table 4 shows that, considering the p-values in the main model (3), all independent and control variables except Debt-to-Equity are highly significant to the model at a level of 5% or lower. Therefore, H1 is supported because it is demonstrated that ESG performance has a significant effect on market valuation measured by Tobin's Q. The estimated coefficients of ESG performance of all three models in Table 4 exhibit a slightly negative significant relationship to Tobin's Q, suggesting that a firm's ESG performance has a small negative influence on market value and consequently causes a lower valuation for companies.

This study, similar to Li et al. (2018), standardizes the ESG variable in order to obtain results that were more suitable for interpreting the influence of ESG performance on Tobin's Q. For the main regression model (3), the paper finds that one standard deviation increase in ESG performance leads to a reduction of 0.1530 (-0.0090*17.005) in the value of Tobin's Q, in respect of a firm's market valuation. Although a change of 0.1530 may not seem like much, it is actually 1.146% of the maximum Tobin's Q value of 13.355 in the sample. For Tobin's Q values close to one, this change could make a big difference, either in direction of below or above 1. Consequently, it can be assumed that ESG performance has a significant influence on the appropriate assessment of over- or undervaluation of a company.

Additionally, Table 4 shows that for the first control variable, Firm size, the coefficient of -0.4662 suggests a significantly negative relationship. Therefore, this implies that an enhancement of 100% in the number of employees leads to a reduction of 0.4662 in Tobin's Q, respectively in market valuation. Similar effects can be found in recent literature like Ademi and Klungseth (2022). An increase in Firm size, supposing the hiring of more employees, could be associated with raised costs and therefore might reduce market value. In contrast to that, Total Asset Turnover highly increases Tobin's Q on a significance level of 1%, referring to a coefficient of 1.2273. This is not surprising, as greater revenues are highly attractive for investors and will raise the market valuation. Opposed to most of the prior research, this study's Debt-to-Equity variable presents unsignificant values and hence, is not further considered in this analysis.

Examining the relationship between ESG performance and market valuation over the total period of the study (2013-2019), it was found that the effect increased steadily over the years.

As a next step this study also tested the ESG Combined Scores from Refinitiv DataStream and compared them with the results from the main regression. As the outcome was not as significant and additionally the values were similar, the results were not included in the analysis.

Table 4: Results of main regression

	(1)	(2)	(3)
ESGP	-0.0068	-0.0122***	-0.0090**
	(0.110)	(0.009)	(0.032)
SIZE			-0.4662***
			(0.004)
DE			0.0004
			(0.701)
TAT			1.2273***
			(0.000)
Year Dummies	YES	YES	YES
Constant	2.4462***	2.6816***	6.1461***
	(0.000)	(0.000)	(0.000)
Observations	2107	2107	2107
R^2	0.0084	0.0128	0.0686

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.2 Results of sub sample analysis

4.2.1 Mean analysis of subsamples

As prior literature predominantly presented positive results for the TQ-ESGP relationship, this paper did not expect a negative outcome and therefore aims to analyse which type of firms might have caused this outcome. Hence, this study regards it as essential to divide the sample into subgroups based on total assets, leverage and ESG Rating in order to analyse more closely for which groups the effect of ESG performance (ESGP) on Tobin's Q (TQ) is dependent. In these subsample models the Debt-to-Equity variable is not included due to the fact that its results for the main regression as well as for these subsample regressions presented insignificant values.

The subsamples are generated by dividing the main data set into groups of firms that exceed or underperform the median of the category total assets, leverage and ESG Rating per industry. The third category separates the firms into groups of "greener" and "less green" businesses within each industry.

Table 5 shows the mean values for the dependent variable as well as for the independent and control variables. Considering the first category of groups, concentrating on total assets, it is

interesting to note that larger companies have higher ESG performance on average, but their values for Tobin's Q and Total Asset Turnover (TAT) are lower. This can be attributed to their higher capital to invest in ESG purposes and the higher surveillance that such companies are under, and which might affect their market valuation. Additionally, this also makes sense from the small firms' position. These maybe more innovative and young businesses might have less assets but still present a high market capitalization as well as large revenues which could increase the Tobin's Q ratio and also the Total Asset Turnover.

Regarding the second set of groups, focused on degree of leverage, it is important to mention that the mean values for Tobin's Q are higher for companies below the ordinary leverage level. This indicates that market participants might feel encouraged investing rather in a low leveraged firm and results in a possible overvaluation in the market. However, as highly leveraged companies also own more capital to invest in sustainability activities their ESG performance is superior. The mean of the Firm size variable (SIZE) is slightly higher for firms whose leverage lies below the median as more employees probably would choose to work for a firm with less debt. Similarly, the Total Asset Turnover is also higher for a low-leveraged firm which might be grounded on reputational reasons.

After examining the results of the first two subgroup pairs, this paper also studies the third category, focused on ESG Ratings. The Tobin's Q and the Total Asset Turnover show greater mean values for the subgroup of lower ESG scores which might suppose that firms placing less importance on sustainability provide a higher market valuation and higher sales. The latter scenario might even confirm the cost-of-capital-theory based on the fact of investors and customers preferring companies that don't have to bear those costs. The value of ESG performance as well as the value of the Firm size variable is better for firms owning better ESG Ratings, which might suggest that the increasing awareness of more sustainable companies might even affect the appraisal of its employees.

Table 5: Subsample Mean Values

	High Assets	Low Assets	High Leverage	Low Leverage	High ESG	Low ESG
TQ	1.514	2.553	1.777	2.294	1.947	2.124
ESGP	64.896	56.024	61.431	59.461	72.763	48.163
SIZE	10.660	9.787	10.152	10.292	10.614	9.831
TAT	0.723	0.940	0.726	0.938	0.823	0.841

4.2.2 Results of subsample regression

Table 6 shows the results for each of the subsample regressions. It can be noted that only firms which have fewer assets, own a lower degree of leverage or show an ESG Rating below the median of their industry produce significant results for the influence of ESG performance (ESGP) on Tobin's Q (TQ) on a significance level between 5% and 10%.

Analysing the first category of subsamples, based on *Company size*, this study observes an R-Squared of 0.0004 for larger firms and 0.0623 for smaller firms. This suggests that the independent variables explain the variance of the dependent variable better in the dataset of firms with smaller size than in the sample of firms with higher Company size. Out of those two subsamples, only the one with lower size presents a significant relationship of ESG performance and Tobin's Q (-0.0171). As here the ESG-TQ effect is proved to be dependent on *Company size*, H2 can be confirmed but only for the subsample with smaller size. The results of both groups are additionally utterly distinct from each other, resulting in an observation that there is an apparent difference between the two groups.
The control variables of the group of small firms, Firm size (SIZE), measured by the natural logarithm of number of employees, and Total Asset Turnover (TAT), shows coefficients of -0.8557 and 1.8352 respectively, implying an impact with more significance for smaller companies. In contrast to that, the subsample of larger firms only displays significant values for Firm size and Total Asset Turnover.

In the following paragraphs, this study examines the regression results of the second pair of subsamples, which focuses on firms' degree of leverage. It is observable that the subsample of high-leveraged firms provides a higher R-squared (0.1156) and therefore a better explained variance of the TQ ratio than its counterpart. However, this high-leveraged subsample delivers no significant relationship for the connection between ESG performance and Tobin's Q whereas the group of low-leveraged companies provide a coefficient of -0.0123 for a significance level of 10%. As the ESG-TQ effect is shown to rely on *Leverage*, H3 can be confirmed here, but only for the subsample with a smaller degree of leverage. Additionally, both groups' findings are thoroughly different from one another, indicating that there is a noticeable difference between the two groups. This group of less-leveraged businesses shows significance for ESG performance and additionally Total Asset Turnover (0.8991), whereas its

counterpart subsample presents significant results for Firm size (-0.5025) as well as Total Asset Turnover (1.8070).

Moving to the third category of subsamples, concentrating on companies' *ESG Rating* within each industry, this study found that the less sustainable companies provide a much better model than their counterpart sample. This is attributable to the higher R-squared of 0.0850 indicating that the group with lower ESG Ratings explains a higher percentage (8.50%) of the variance of TQ than its counterpart. In contrast to businesses with higher ESG Ratings this mentioned subsample exhibits significant results for ESG performance (-0.0131) and Firm size (-0.7275). It is therefore evident that the effect of ESG performance on Tobin's Q is dependent on ESG Ratings, H4 can be confirmed, but only with respect to the subsample of smaller ESG Ratings. The fact that the findings of the two groups are completely different from one another also indicates that there is a discernible difference between the two groups. For the firms with better ESG Ratings within each industry, it is observable that the results for ESG performance and Firm size are not significant. TAT is the only significant variable at a level of 1% for all subsamples.

In summary, one can declare that in all subsamples the correlation between ESG performance and market valuation present slightly negative results. However only some of the subsamples show significance for this relationship. In total, all hypotheses are confirmed, but only due to the fact that in each category only one subsample provides results that validated an effect of ESG performance on market valuation that is dependent on the respective category.
Finally, it is observed that companies with a smaller company size, a lower degree of leverage as well as worse ESG Ratings provide significant and slightly negative results for the relationship between ESG performance and market valuation, measured by Tobin's Q. Therefore, it is evident that when the ESG performance of those companies increases, it contributes to a reduction of firms' market valuation. As a consequence, it can be argued that those types of firms might present the key drivers for this dataset, providing a slightly negative correlation between ESG performance and market valuation for the analysed firms.

Table 6: Results of subsample regression

	Higher Company size	Lower Company size	Higher Leverage level	Lower Leverage level	Higher ESG Rating	Lower ESG Rating
ESGP	-0.0039	-0.0171**	-0.0055	-0.0123*	-0.0068	-0.0131*
	(0.232)	(0.040)	(0.195)	(0.099)	(0.322)	(0.099)
SIZE	-0.2131*	0.8557***	-0.5025**	-0.3988	-0.1711	0.7275***
	(0.080)	(0.002)	(0.012)	(0.129)	(0.449)	(0.008)
TAT	0.5879***	1.8352***	1.8070***	0.8991***	1.5864***	1.1404***
	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)	(0.000)
Year Dummies	YES	YES	YES	YES	YES	YES
Constant	3.5073**	9.8443***	5.7154***	6.0908**	2.6771	8.7876***
	(0.012)	(0.001)	(0.005)	(0.040)	(0.275)	(0.002)
Observations	1050	1057	1053	1054	1052	1055
R-squared	0.0004	0.0623	0.1156	0.0513	0.0611	0.0850

p-values in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5. Implications, limitations and future research

This study aimed to analyse the effect that ESG performance of S&P 500 listed firms has on their market valuation, measured by the Tobin's Q ratio. Moreover, it more deeply examined this relationship of ESG performance on Tobin's Q by separating the dataset into groups based on different categories. The study created six groups of firms exceeding or remaining below the mean of their *Company size*, degree of *Leverage* and *ESG Rating* per industry. This separation distinguishes this paper because, in contrast to other papers, it additionally analyses which groups of firms present the key drivers of the impact of ESG performance on Tobin's Q. Similar to Alareeni and Hamdan (2020), this paper followed the approach of dividing the data into subsamples and undertaking a mean analysis. However, Alareeni and Hamdan (2020) used a different study period and conducted difference and performance tests instead of a full regression.

In contrast to the majority of research papers, this study obtained a slightly negative correlation between ESG performance and market valuation. This might be attributable to the fact that another dataset as well as another time period was applied. Nevertheless, the paper aimed to more deeply explore the cause of this negative relationship with the hope of achieving

interesting results by generating the aforementioned subsamples in order to ascertain if the effect of ESG performance on market valuation is dependent on certain groups of companies. Analysing the results of those subsamples, it is observable that firms with smaller company size, less leverage and lower ESG Ratings tend to have a higher market valuation and are even overvalued. It can be concluded that these kinds of firms might be impacted and probably are responsible for the result of the main regression, which shows a slightly negative TQ-ESGP relation.

These outcomes contain some important implications for policymakers, managers and investors but also for stakeholders and shareholders. As sustainability activities become increasingly relevant for investment, it is crucial for all market participants to know that the market valuation of certain company groups tends to be more impacted by ESG performance. The findings of this research could be beneficial for policy makers, as they might demonstrate the need for practical initiatives based on how stakeholders view ESG elements and their effect on the market valuation of enterprises. This study found the impact to be negative, potentially leading companies to avoid investing heavily in sustainable practices in order to maintain their market valuation. There is no doubt that financial management and socio-ecological sustainability are signs of effective management (Ziegler and Schröder, 2010), but the final outcome also relies on the type of business under consideration.

While demonstrating an impact for several stakeholders, this study is not without limitations. As mentioned earlier, the paper used the ESG Scores of Refinitiv DataStream as an indicator of firms' sustainable performance. However, these scores might not perfectly reflect the companies' engagement. When individual scores are combined into one ESG Score, separate advantages of similar categories might cancel each other out (Alareeni and Hamdan, 2020). This is why it can be useful and informative to also test the three different components of the ESG score individually.

Another limitation involves the dataset only including firm data and ESG scores of public companies listed on the S&P500. The results are therefore only applicable for listed companies while smaller or medium-sized businesses are left out due to data restrictions (Li et al., 2018). Additionally, further analysis is required to enlarge the sample by extending the study period, as some efforts may take years to implement and may not yield immediate benefits (Bansal et al., 2021). Certain businesses might take longer for the associated benefits of ESG engagement to materialize into a positive market valuation.

In addition, the geographical factor of the observed companies, specifically the fact that they are located in different regions of the United States, is important to consider. In this context, not only the laws and regulations but also the urban and social circumstances might differ from each other. As a consequence, each company has to bear individual challenges, originating either from special ESG regulations, state-related politics or other constraints.

An interesting possibility for future research would be to analyse how ESG activities can be less costly and, additionally, how the government might support companies in improving their sustainability performance. It would be interesting to conduct research that is adjusted or even focused on the geographical differences in the United States. Researchers might also consider analysing medium-sized firms that are not listed, as they might have different cost structures and other mechanisms to implement ESG engagement.

6. Conclusion

Considering the contentious debate about ESG performance affecting firm valuation, this paper aimed to analyse this relationship applying a data sample of S&P 500 listed firms over a study period of 2013 until 2019. The dataset contains 2,107 observations obtained from 301 listed firms. As dependent variable and proxy for firms' market valuation he Tobin's Q ratio was used, whereas the independent variable was represented by the ESG scores measured by Refinitiv DataStream (Thomson Reuters). In order to achieve statistically significant results this paper used Firm size, measured by the natural logarithm of number of employees, Debt-to-Equity ratio and the Total Asset Turnover. The results of the main regression provided a slightly negative influence of firms' ESG performance on market valuation. This was not expected, given that the majority of studies obtained positive results for this relationship. However, as the studied firms have been more sustainably engaged during the last years, there are greater costs to bear and ESG efforts may not see a financial return in the long term.

As mentioned, the main regression presented different results than other studies. Therefore, this paper aimed to delve deeper into the analysis and assess what might be the source of this relationship. The paper did this by conducting a subsample regression analysis. As part of this investigation the main dataset was divided into six subsamples that either exceeded or underperformed the yearly median of the following categories: *Company size*, *Leverage* and *ESG Rating per industry*. The mean analysis showed that higher ESG scores were achieved by firms of higher Company size, greater degree of Leverage and better ESG Ratings. In contrast,

the results for Tobin's Q presented greater values for companies with smaller Company size, less Leverage and worse ESG Rating. Considering the regression analysis, this paper obtained significant results for the impact of ESG performance on market valuation for the subsamples of firms with lower Company size, less Leverage and worse ESG Rating. As all subsamples' coefficients for ESG performance were slightly negative, this again indicated, at a statistically significant level, the negative correlation of TQ-ESQP in this dataset.

The outcome of the subsample analysis, including the identification of which groups of firms might be the key drivers of the effect ESG performance has on market valuation, presents a highly relevant implication for the economy and for further research. It also provides useful information for policy makers, managers, investors, and other stakeholders. Knowing which groups of companies are impacted most by the relationship between ESG performance and market valuation could help them make better informed decisions.

This paper also has some limitations such as ESG performance not perfectly reflecting companies' sustainability engagement, the dataset only including public companies listed on the S&P 500, the sample size, the geographic aspect of the companies, and the lack of governmental support.

Future research should focus on reducing the aforementioned limitations by examining larger datasets, including medium-sized or non-listed firms and by investigating geographical differences in the US. Additionally, it might be profitable for researchers to analyse how ESG activities can be less costly and how the government might support companies in improving their sustainability performance. The literature could also focus on creating proper valuation techniques for companies in order to gain adequate results for the Tobin's Q ratio.

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