How Environmental and Social practices affect corporate financial performance and valuation

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Abstract

This thesis investigates the relationship between corporate sustainability initiatives, particularly the environmental and social pillars of ESG disclosure and corporate financial performance and firm value. While conducting the research, a sum of 84 publicly traded companies with highest ESG exposure industries were selected ranging the dataset from 2014-2023 sourcing all the data from The Thomson Reuters Eikon Database. A panel structured dataset was constructed for all the empirical works. The findings revealed mixed results for the stated relationship for firms' core financial performance and valuation. While the environmental initiatives seem to have a negative impact on the financial performance, possibly due to high initial costs in the short run, the social pillar demonstrated a positive significant relationship that makes the conversion even in the short-run profitability. Different findings were observed when examining the same relationship with firm value. Even the environmental pillar showed a positive significant impact on the long-term considerations of firm value. Moreover, the impact of environmental and social pillars was also observed when the variables were isolated. While it didn't show any promising results for immediate profitability on their own and they remain positive and significant for firm valuation. That opens the door for further investigation about the effectiveness of environmental and social pillars in the short and long-term. This study aims not only to provide better insights into previous related research but also to benefit researchers, managers and policymakers to make strategic practical decisions.

Preface

This thesis was completed as part of the master's degree, MSc in Finance at Aalborg University. The main motive for conducting this study was to investigate the relationship between the Environmental and Social practices from ESG disclosure and financial performance of publicly traded companies from industries with most ESG exposure.

I have completed my bachelor's degree in finance and worked in this sector for years in corporations. When I moved to Denmark to complete my master's degree in finance, being in one most the most developed countries in the world, I realized the how important sustainable development is in today's world. Hence, I have decided to examine the impact of these sustainable initiatives of corporations into their financial outcomes.

Writing this master's thesis was a challenging and tedious process. Especially, when you're at a foreign land where your day is a new challenge. However, I enjoyed the process and learned so much meanwhile. I am glad that I finally found the motivation to complete the thesis.

I would like to thank my supervisor, Frederik Steen Lundtofte for his continuous support and insightful feedback during the semester. I would also like to thank my friends, family and Mia for their support along the way.

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1. Introduction

In recent times, sustainability efforts in the corporate world have gathered a lot of attention all over the world. We only have one planet to live. However, extreme weather conditions and natural disasters have become common sights for us due to uncontrolled human activity across the world. Of course, if not taken seriously into account the more depletion and deterioration is yet to come. As part of society, corporations around the world also must contribute to the well-being of our planet. This phenomenon has gathered attention from all the researchers, investigators as well as general stakeholders of corporations. While in the past the firms were only evaluated based on their financial performance and investors' returns, now stakeholders also put equal emphasis on the environmental and social aspects of it. This shift is now resulting in more and more literature to be examined in this relationship of corporate environmental and social practices and how they really reflect in the overall financial performance of firms. As CSR and ESG disclosure are two dominant determinants of corporate sustainability initiatives, a lot of studies have already been conducted between these variables and overall firms' performance, suggesting that they might a positive influence between them.

Over the past few years, pressure from regulatory bodies and demand of the stakeholders have made this topic inevitable to understand well for corporations. Even though firms all over the world have to comply by the rules, several studies have been conducted to have a better understanding of the matter. However, not all the previous research has shown similar effects. Some studies have observed mixed relationships, even reversed ones, which has opened the door for even further analysis. A lot of the studies have shown that this CSR and ESG disclosure's relationship can be dictated by industries, geographical locations and even firms' characteristics. Even a simple methodology of these researchers can also indicate differences between the relationships.

Our study aims to provide some contributions to the ongoing process of investigating the relation by answering our research question:

How do the environmental and social practices affect firms' financial performance and valuation of publicly traded companies?

By analyzing a comprehensive dataset made up with ten years environmental and social initiatives along with financial outcomes, this study aims to provide a deeper understanding of this relationship. It also goes further by isolating the environmental and social pillars to study how each initiation affects the overall performance of firms. The outcome of this study also hopes to benefit the managers and policy makers in real life implication, as the outcomes can help them to embrace sustainability as corporate strategies.

The overall study is segmented in five parts. Part discusses the introduction, while in part two the theoretical framework and previous literates will be presented. In the third section, overall methodology and data description will be provided. The fourth section is allocated to the results and discussion of the empirical works. Finally in the last section, the conclusion will be discussed.

2. Theoretical Framework

Several research have been conducted to study the relation of the topic. But mostly the research have been mostly focused on CSR/ ESG and financial performance. Reading through the past papers published, it was found that the existing theories that support our topic.

2.1. Sustainability Theory

In the recent world, sustainability is a major topic. The world is caught up with so many challenges to take care of. Climate change, environmental deterioration, imbalance in the ecosystem have been prevailing and it is still not the worst. It is predicted World Economic Forum, 2020, that the frequency of this such events are increasing, and the world will face more events like this in the future. So, the sustainability theory is so important nowadays.

In general terms, sustainability is meeting the needs of today, without compromising the future. Sustainability theory provides guidelines for complex human activities and natural environment so that the humans don’t harm the planet earth. The Brundtland report has provided definition for sustainable development as “development which meets the need of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

Not just that, it has been found that recently the non-financial reporting is getting high demand from the stakeholders, and it is being rewarded well. CSR reports tend to increase the transparency and contribution of the company for society which is being a big source to minimize risk and build goodwill.

2.2. Corporate Social Responsibility

Corporate Social Responsibility or CSR is the way for companies to balance their economic and environmental, and social concerns. In other words, CSR refers to the method of companies to make sure that they are achieving economic goals and also providing social goals for the society. In today's world, a company must not only make profit for the organization but also think about all the stakeholders. CSR helps companies to achieve such goals.

According to the commission of the European communities (2001) p.7 CSR is "whereby companies integrate social and environmental concerns in their business operation and in their interaction with their stakeholder on a voluntary basis". Professor Emeritus Archie B. Carroll described CSR into four different pillars which were called the pyramid of CSR 1991. According to her CSR duties fall into philanthropic, ethical, legal and economic pillars. Where Philanthropic is the expectation of the society from the company meaning the company will provide resources to the society as being part of it. In ethical pillar, the company will have the judgement of right and wrong and not commit anything that is ethically wrong to the community. Legal is where a company will comply with the existing legal system and economic is the core business activity the company will make profit from and survive as a business using its efficiencies (Carroll, 1991 p.40).

Godfrey, Merrill and Hansen stated in 2009 that these CSR activities help corporations to achieve beneficial profits and lower the risk of reputation if corporation invest in CSR in expectation of return from the society. Furthermore, McWilliams and Siegel (2006) found that there is a strong positive correlation with CSR activities and the economic aspect of corporations. It was found that such efforts from corporations are highly appreciated by the customers and investors which further leads to high economic benefits for the companies. Waddock and Graves (1997) also stated in their study that there is a positive relation between CSR and financial performance of corporations. It was stretched that

companies with companies that are profitable have the resources to invest further in CSR and enjoy the return.

2.3. Environmental, Social and Governance

As people are more concerned about a better future, corporations all over the world are giving more importance to ESG. Lately, directors are taking ESG performance as their long-term non-financial strategy to secure risk management and competence among the industries.

Many recent studies have made it clear that a good ESG score can enhance a company's financial performance to a great degree and it can be a big resource to the corporate risk (Zhao, Guo, Yuan, Wu, Li, Zhou, & Kang 2018). Further research has been conducted by Ali Fatemi, Martin Glaum and Stefanie Kaiser (2017) which provides the positive relationship ESG performance and firm value. They show that strong ESG supports to increase firm value while weak ESG score decreases it.

However, according to PWCs pulse report, a gap has been traced between the corporations and the investors in terms of ESG information. In order to invest and understand a company better the investors need to have adequate ESG related information of the company. But the disclosure of such information isn't mandatory. That's why not all the investors are provided with this type of information regardless of their ESG score good or bad (PWC Pulse report 2019). This is the reason many companies' environmental issues are not their long-term business strategy.

Another study conducted on the energy sector by Ekatah, Samy and Halabi in 2011, states that they companies need to focus on the ESG related governance if they want to have better operating performance and it will likely decrease if they only think about benefit their shareholders only. As a result, all the major companies across the world are now applying ESG performance as their long-term strategy which is also affecting the relationship between sustainability and financial performance (Pätäri et al., 2014).

2.4. Economic Theory

In terms of economic theories, there has been a lot of research and debate made to understand the business better. There are five main block of theories that represent the relationship between financial performance of a firm and corporate social responsibility.

2.4.1. Instrumental Stakeholder Theory

Instrumental stakeholder theory is based on the relationship of a firm and its stakeholders. This theory suggests that CSR activities can help firms to enjoy corporate financial performance building good relationships with stakeholders. In 1984 Freeman was one of the pioneers to discuss the broader aspects of stakeholder theory. As Freeman (2010) mentioned if a firm embraces non-financial activities as its long-term strategy, this will benefit both the parties. It was also stretched by another study made by Donaldson and Preston (1995) stating that the stakeholder theory also needs to provide more importance on empirical aspects of the firms. Jones (1995) suggested that instrumental stakeholder theory will form a better relationship with the firm and among its stakeholders, which will eventually reduce associated problems such as agency problems and transaction costs.

2.4.2. Trade-off Theory

On the other hand, trade-off theory demonstrates a negative association between corporate social responsibility and corporate financial performance. According to Mcwilliams and Siegel (2001) that the resources spent on CSR initiatives would derail a corporation from profit making activities and lead to low financial performances. Another study conducted by Margolis and Walsh (2003) supported the view with empirical evidence that there has been a negative relationship between CSR expenditures and financial performance. Being engaged in socially responsible activities would lower financial performance (Preston & O'Bannon, 1997).

2.4.3. Slack Resource Theory

The slack resource theory states that the firms that have greater financial resources will be in a better position to invest in CSR initiatives. Thus explain a positive relationship with corporate financial performance and social responsibility. Empirical evidence was found backing this theory by a study by

Peloza and Shang (2011) demonstrating that companies that are healthy have enough resource to engage in CSR activities and subsequently enjoy financial benefit. According to McGuire, Sundgren, & Schneeweis (1988) engaging in such activities would reward the companies financially and low socially responsible companies had lower ROAs in return.

2.4.4. The Managerial Opportunism Hypothesis

The managerial opportunism hypothesis suggests a negative relation between corporate social responsibility and financial performance, This theory states that the managers are more concerned about short-term goal rather than the company goals and they seem to exploit the CSR activities for their own interest and gains. In one study Hillman and Keim (2010) stated that the managers use such CSR activities to manage their reputation which leads to worse financial performance in the long run.

2.4.5. The positive/negative synergy hypothesis

The positive/negative synergy hypothesis suggests a more complex relationship between corporate social responsibility and corporate financial performance. According to this theory the elements can show both positive and negative relationships. Research conducted by Orlitzky et al. (2003) backs up the idea by providing empirical evidence showing CSR has different impact on corporate financial performance in different industries and countries.

2.5. Previous Research

In today's fast paced world, where industrial revolution has reached skyrocket high, sustainability is a major concern. Competition among the corporations is now adding new dimensions for production and its safety standards.

Back in 1987, Brundtland's report on sustainability provided a glimpse of the relationship between our expectations for a better life and the constraints imposed by our natural resources. Since then, the concept of sustainability has evolved too far. However, this evolution has drawn a sharp line in our collective welfare expectations and environmental conservation. While we are depleting our natural resources at the same time, we generate capital and knowledge (Amir Reza, 2023). Hence, we need to

find a balance that lies in a fine line between these two objectives where our foremost consideration is the well-being of the future generation.

Another study was conducted by Pätäri, Arminen, Tuppura, & Jantunen (2014) which takes into consideration the CSR concern and strength in companies in the energy sector. Their aim was to find out whether efforts and investment in CSR affects the financial performance of the companies. They chose 14 different companies and financial data from 1991 to 2009 and used Granger causality test to study the relationship. Their finding was that the efforts in CSR affect the financial performance differently and it also depends on how the relationship was measured due to market value and profitability (Pätäri et al., 2014).

Gonenc and Scholtens (2016) have studied the relationship between environmental and financial performance from 2002 to 2013. The study was based on fossil-fuel firms from all over the world. They also took into consideration non-fossil-fuel companies for that matter. The author concluded that the environmental performance in the industry does not affect the overall performance even though they outperform other industries in terms of environmental performance. However, they tend to mitigate financial risks to some degree.

Ekatah, Samy and Halabi, (2011) explored the relationship of CSR and financial performance of Royal Dutch Shell. This company was chosen for their case study because it is one of the biggest corporations in the industry. For the purpose of the study, they used Royal Dutch Shell's KPI for the last five years from their sustainability report and annual accounting data. They have found a strong positive relationship between these two determinants.

Bohyun Yooun, Jeong Hwan Lee and Ryan Byun (2018) conducted another research to study the relationship between ESG performance and firms value, their topic of the study being "Does ESG performance enhance firm value?". They went further by categorizing the firms into environmentally sensitive and non-sensitive industries. Their finding was like past studies. However, they have concluded that in terms of non-environmentally sensitive firms tend to have less effects from environmental performance. They also found that the effects are bigger in developed countries than it was on the developing countries (Yooun, Lee and Byun 2018). In developing countries, the firms are much profit oriented than the environmental and non-financial issues.

2.6. Hypothesis Construction

As the last section talked about mostly how and previous researchers were conducted in the this idea, this section will mostly elaborate the construction of the hypothesis for our research question which is whether or not sustainable efforts by the corporates actually affect the financial performance and overall firm value of corporations.

Many researchers were conducted to find the relationship of CSR and financial performance. One of the earliest ones was developed by Waddock & Graves (1997). In their study they mainly examined the relationship between CSR and financial performance. Their suggestion was that firms with better ESG performance can enjoy better performance financially as a result of better reputation in the market, customer loyalty and new efficiencies.

Another significant study conducted by Orlitzky, Schmidt, & Rynes in 2003, states that there is a positive correlation between CSR and CFP. Their conclusion was developed from 52 meta-analysis study. They also found that this relationship holds across industries and geographical locations. This study provides evidence that better CSR companies do better in both accounting based (ROE, ROA) and market driven measures (stock returns).

Companies that embrace better ESG practices enjoy better financial performance, especially in the long run Eccles, Ioannou, & Serafeim (2014). In their study they compared the high and low sustainability companies and found that companies with high-sustainability practices almost constantly outperform financially the low-sustainability companies.

Margolis & Walsh (2003) reviewed 127 studies and found that there is a strong positive association between CSR and financial performance. Although, they also stated the relationship is complex and context dependent.
Ioannou, I., & Serafeim, G. (2017) took the measurements one step ahead. They examined the relationship between environmental and social aspects of ESG and found a positive influence with financial performance such as ROA. Similar results were found on a study conducted among the Chinese firms Wang, X., & Li, J. (2020). These previous studies provide us with an expectation to have a positive relationship between CSR efforts, more precisely environmental and social (E and S) and

financial performance. However, the relationship is variable dependent on other variables such as industry, time and specific ES activities. Hence, throughout this study we will try to examine the relationship with more scrutiny. This is reflected in our hypothesis.

Hypothesis 1: Strong environmental and social practices (E and S) together lead to improved financial performance

There have been a lot of studies that tried to pinpoint the relationship between CSR and financial performance and firm value. Not all the studies conducted have similar results, providing a complex relationship. Adam (2002) discusses that stakeholder theory suggests that focusing on ESG might not provide immediate financial gains in the short term. The relationship between them is negative and can have the potential to lower the firm value. In another study Krüger (2014) states that the negative news regarding the ESG can also have a greater negative impact on the firm value.

As mentioned earlier, Eccles, R. G., Ioannou, I., & Serafeim, G. (2014) suggests enhanced CSR activities can have a positive impact on the firm's value because of better transparency and efficiencies embraced by the firm.

As ESG has a great impact on customers' perception of the firm, it is also an important variable to consider. In their study Servaes and Tamayo (2013) found that CSR has the ability to positively affect the firm value because of high customer awareness. Luo, X., & Bhattacharya, C. B. (2006) also tried to find out the impact CSR has on customer satisfaction and firm value. They found the positive relationship between ESG and firm value which was measured by Tobin's Q. El Ghoul, S., Guedhami, O., & Kim, Y. (2011) took the idea further and examined the impact of environmental and social aspects of CSR activities. They found a strong positive association. Bassen and Kovács (2008) conducted a review of studies associated with CSR efforts and firm value. Their study concluded firm value tends to increase with strong environmental and social score of firms due to investor's positive perception. Waddock, S., & Graves, S. B. (1997) published in their paper that there is a strong positive relationship between these two as their study found environmental and social efforts (ES) have a strong association with firm value (Tobin's Q). Our second hypothesis was based on this conception.

Hypothesis 2: Strong environmental and social practices (E and S) together lead to increased firm value

Sustainability efforts for corporate firms has become one of the biggest indicators for investors. It gives the investors idea that what the firms are doing to cope with current environmental distress. In a study Huang, X., & Yang, Y. (2019) mentioned that environmental and social aspects of ESG play a huge role, and each has independent and significant effect on firm's financial performance and valuation. They found that E and S both tend to improve the firm's value individually. Hence both are important measures and should be treated separately in valuation analysis. Mao, C. X., & Zhang, X. (2020) also found that E and S both positively affects the financial performance and firms value, measured by Tobin's Q. Hence, our approach will be to dissect the E and S to each part and observe individual effects on financial performance which is ROA and overall firm value, Tobin's Q. By this approach we can understand each pillars contribution separately.

Hypothesis 3: Environmental and Social, both pillars have independent and significant impact on Firm's financial performance.

Hypothesis 4: Environmental and Social, both pillars have independent and significant impact on Firm's value.

3. Methodology

This section provides information about the methodology used throughout the research. It gives a description of the approach used to study the relationship between ES disclosure and the corporate financial performance along with all the variables and timelines.

The main purpose of this thesis is to observe the relationship between ES and the financial performance of different companies across different industries. To study this behavior a 10-year time span has been taken into consideration. Dataset used is panel data for the whole process. To study the relationship of two subjects in this research OLS (ordinary Least Squares) has been used. Fama-Macbeth is another approach that could have been used. Georgios Skoulakis (2008) used both approaches and found reliable results and relevance. However, in this study we used the OLS approach in align with the study

conducted by Waddock & Graves (1997) who study the relationship between CSR and financial performance.

3.1. Sample Selection

The database used for this thesis is The Thomson Reuters Eikon Database. A wide range of companies were selected from S&P500 index for the matter. The companies were mainly selected from seven different industries such as Food Products, Beverages, Technology Hardware, Storage & Peripherals, Household Products, Textiles, Apparel & Luxury Goods, Energy Equipment & Services, Independent Power and Renewable Electricity Producers, Chemicals, Semiconductors & Semiconductor Equipment, Oil, Gas & Consumable Fuels. A wide range of industries were selected as the intension was to observe the most affected sectors by ESG exposure. For instance, Energy, Oil, Gas, and Consumable Fuels, and Chemicals industry are known for having intensive environmental effects related to environmental pillar while companies from Food products, Household products and Textile industries are often known for high scrutiny due to their labor practices and supply chain management which falls under the social pillar. Friede, Busch, and Bassen (2015) in their study included energy and oil industry to observe the relationship between environmental intensive industries and ESG responses. On the other hand, Ioannou and Serafeim (2012) preferred Food and Beverage industries to examine both environmental and social aspects of it.

The companies were selected also based on the market capitalization of the most recent year due to bigger companies having the better ability to focus on sustainability initiatives. There have been 504 companies within S&P500 and among them 84 companies were selected from these 11 industries. The selected industries share 10 years data creating 840 observations to take care of.

3.2. Timeline of Data

The timeline has been selected to be the last 10 fiscal years accounting data available for the public. The timeframe starts from 2014 to 2023. The reason to choose the last 10 years data is to take into consideration the most recent observation history to study the numbers. The timeline also consists of the post covid period all the firms went through. Most of the companies selected for the thesis have a

history of disclosing the ESG performances. This made the overall dataset balanced for the empirical analysis.

3.3. Variables

For this research several variables have been used. In this section all the dependent, independent and control variables will be discussed. All the variables have been collected from Thomson Reuters Eikon Database with the help of Aalborg University.

3.3.1. Dependent Variables

After studying the previous studies it's been found that most of the research was done using two types of drivers of data. Both aim to identify similar results but in different manners. The first historical accounting data. It's solely based on the firm's performance and all the data that the firm has disclosed for the purposes of their accounting systems. An example of using this type of data to conduct research can be found on Waddock and Graves (1997). Their idea was to capture the screenshot of profitability by using Return on Asset and Return on Equity. On the other hand, market driven data tends to put more emphasis on market performance in the industry. Both measurements have their own contributions. As different firms use different accounting systems, market measurements omit this problem. Also, this makes sure that the data is out of any sort of manipulation. In our research we will consider both perspectives to have the overall and more transparent picture.

For the dependent variable we chose to use the Return of Asset of these 50 firms operating across different industries. It was inspired by the study made by Waddock and Graves back in 1997.

Return on Asset = Net Profit / Total Asset.

And for the market-based perspective we chose Tobin's Q

Tobin's Q = Market Value of the Firm / Book value of Asset

Tobin's Q has been used widely in a lot of research. Hence, we chose this market-based variable for our empirical work. According to (Perfect and Wiles, 1994), Tobin's Q is widely accepted to the research as it considers both tangible and intangible assets. However, inconsistency among the results have been found when research has been conducted while taking 62 random samples with different

estimators. Still this estimator can be used further suggested by the researchers (Perfect and Wiles, 1994).

3.3.2. Independent Variables

As this study aims to find out the relationship between efforts towards sustainability and the financial performance of companies, our independent variables have been chosen to be the ESG disclosure. However, the focus of this study is to find out the specific impact of environmental and social impacts of ESG on the corporate financial performance. Hence our main independent variables are E and S which is the same as Brammer, Brooks, and Pavelin (2006), in which they also found that E and S has a strong relationship with corporate financial performance while G has significant impact overall. Waddock and Graves (1997) stated while E and S showed positive correlation in many cases with financial performance, G was inconsistent and insignificant throughout most of the models. This suggests that G might be an important estimator, but it does not have the strong and direct relation as E and S.

Another study by Eccles, Ioannou, and Serafeim (2014) concluded that strong environmental and social practices help a firm enjoy better financial performance. They also suggested that the governance aspect of ESG showed inconsistent results and insignificant in some cases.

Table 1. Breakdown of ESG variables

Environmental	Social	Governance
Resource use	Workforce	Management
Emission	Human rights	Shareholders
Innovation	Community	CSR strategy
	Product responsibility	

Note: Table contains the breakdown of main ESG variables ((Thomson Reuters, 2020)

3.3.3. Control Variable for Capital Structure

Our first control variable in terms of financial performance and risk is Debt to Equity. This is often used in empirical studies to measure the impact of od debt structure and financial health. High

leveraged firms may exhibit high interest expenses and costs which may reduce the profitability or hamper financial performance, this ROA. By taking debt to equity, we can take into out account only the financial risk but also the capital structure of the company. Moreover, debt to equity is a more balanced measure of firms' capital structure and financial risk. As high level of debt can put financial pressure on firms and cost, controlling te leverage in the model will make sure the results are not biased due to changes in debts (Waddock & Graves, 1997). Using a uncontrolled debt can also minimizes the profitability of firms which further limit the overall investment scopes for the firms. So it was suggested that by taking D/E as control variable might mitigate the possibility of biased results for using high level of debt in a firm Myers (1977). In his research, it was also mentioned that D/E ratio provides greater financial risk and any other leverage rations. Hence it is possible to get a clear picture of financial risks. We can obtain D/E by dividing total debt by total equity.

3.3.4. Control Variable for Liquidity

Liquidity is an important term in a firm's financial health. It gives insights of how a firm is doing in the short term financially and its capability to run the firm in current time. We can find the CR just by dividing current assets by current liabilities. As the formula suggests, it considers the ability of the firm in short term assets to observe the financial health to meet the expenses and costs. In general terms, the higher the ratio is the better for the company. It was suggested that the better positioned firms in terms of liquidity are better equipped to meet the financial challengers also enjoy better financial performance Smith (1980). In another study Lobo and Yang (2006) found that firms with better CR can help the firms to invest more in growth activities such as R&D, ESG and CSR. This can have influence in financial performance metrics such as ROA and ROE. As a result including a liquidity spectrum in the analysis will make sure that the observed results are not solely from the differences of liquidity.

3.3.5. Control Variable for Firm Size

Choosing the right control variable in terms of firm size is highly important. In their study Waddock and Graves (1997) mentioned that the smaller firms might not show as responsible as larger firms in terms of CSR. In their study they chose Book Value of Asset as their control variable. Another study by e (Lang and Stulz, 1993) stated that the more companies become diverse the more they tend to lose value. Since our study is following mostly Waddock and Graves (1997), our control variable Book

value of assets. However, unlike Waddock and Graves, a more recent study conducted by Grewal, J., & Serafeim, G. (2019) on ESG's impact on financial performance included market capitalization as their firm size robustness variables instead of the natural log of book value of assets. Market capitalization is often a preferred estimator because it also considers current market dynamics and perceptions. Hence our firm size robustness variable will be market capitalization.

3.3.6. Control Variable for Growth

Growth can also influence the have an impact on the company's market valuation. Usually, investors seek firms that have better growth in the future. It reflects in Tobin's Q as higher growth seems to pull Tobin's Q higher. Hence to control the effect, we have chosen to use growth as the control variable for firm valuation. It also helps control investors sentiment to hold the future expansion that influence Tobin's Q.

3.4. Regression Equation:

This study will focus on the impact of sustainability measures (ESG disclosure, specifically ES) in the equation. To achieve this, we will make the use of ordinary least square (OLS) estimation technique as was done by Waddock and Graves (1997). On top it with study will also measure the environmental and social aspects individually in the regression to find the precise impact. The control variables will be added for further scrutiny.

The general form our linear regression is defined as following.

$$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots + \beta_K X_k + \epsilon}$$

Where **Y** is defined as the dependent variable, $\boldsymbol{\beta_0}$ is the intercept**,** $\boldsymbol{\beta_1, \beta_2 \ldots \beta_K}$ are the coefficients for the independent and control variables, $\boldsymbol{X_1, X_2 \ldots X_k}$ are the independent and control variables and lastly $\boldsymbol{\epsilon}$ is the error term.

3.4.1. Regression Equation for Environmental and Social Performance and Corporate Financial Performance

The first equation studies the direct ES score and its impact on the accounting based financial performance of firms. As stated earlier, ROA being the dependent variable and ES is the independent variable. As control variables, Book value of firm, D/E ratio and current ratio have been addressed. These variables have been chosen based on research conducted by Waddock & Graves (1997). However, few changes have been made in terms of control variables. First, the instead of leverage D/E ratio has been added. Moreover, an additional control variable from liquidity, current ratio, has been added. Because liquidity can have a huge impact on a firm's financial performance. Firms with better liquidity can meet the financial obligations better and contributes to better R&D and CSR efforts which can contribute to have a better ROA, Lobo and Yang (2006).

$$\textbf{Equation one: } ROA = \beta_0 + \beta_1 E_1 + \beta_2 S_2 + \beta_3 BVA_3 + \beta_4 D/E_4 + \beta_5 CR_5 + \epsilon \quad (1)$$

In the second equation, everything kept to be the same, apart from the only variable book value of asset. This variable is replaced by the market capitalization of firms. Since it was our robustness variable, in terms of firm size, this equation will show a clearer picture when the robustness variable is put into the equation. According to Waddock & Graves (1997), the firm sizes can have a great influence on firms' performance. The aim to have this robustness variable equation is to observe the change in results the model archives once market capitalization is introduced.

$$\textbf{Equation two: } ROA = \beta_0 + \beta_1 E_1 + \beta_2 S_2 + \beta_3 MktCap_3 + \beta_4 D/E_4 + \beta_5 CR_5 + \epsilon$$

As we have discussed some previous studies that found the both the pillar E and S have exclusive effects on the financial performance of firms, our further equation will be based on that. To understand the impact of each pillar's contribution to financial performance individually, we must construct two more equations. There the pillars environmental (E) and social (S) will be placed in the equations separately to observe individual effects, if any, as stated in our third hypothesis.

$$\textbf{Equation three: } ROA = \beta_0 + \beta_1 E_1 + \beta_2 BVA_2 + \beta_3 D/E_3 + \beta_4 CR_4 + \epsilon$$

$$\textbf{Equation Four: } ROA = \beta_0 + \beta_1 S_1 + \beta_2 BVA_2 + \beta_3 D/E_3 + \beta_4 CR_4 + \epsilon$$

3.4.2. Regression Equation for Environmental and Social Performance and Corporate Firm Value

These regression equations are based on the market-based measure which in our case is the Tobin's Q. Although choosing variables for this market-based measure, we used a similar approach for that has been done in the study of Waddock and Graves (1997), we have made some slight changes to understand the relationship better. Along with CR we have decided to use growth of revenues. The reason behind this is growth is more important in terms of firm size measures. CR is more relevant to ROA or profitability because CR can influence the operational efficiency of a firm. We also considered taking ROA for control variable as it has the potential to explain how a firm is doing in terms of utilizing its assets to generate profit. It is expected that firms with higher ROA will likely have enough cash to improve their financial performance as well as the market sentiment which eventually cause into a better Tobin's Q. Chung, K. H., & Pruitt, S. W. (1994) and Lang, L. H. P., & Litzenberger, R. H. (1989) both the study have discussed the relationship with Tobin's Q and ROA and Both of them have shown that ROA being an important factor influence Tobin's Q in the great degree. However, growth on the other hand gives us an indication of a firm's future performance and as well as value. Gompers, Ishii, & Metrick (2003) suggested that growth is an essential determinant in terms of the firm size and has a great influence on Tobin's Q. Firm size also has the potential to has an impact on market based firm valuation. Waddock & Graves (1997) and Derwall (2007), both studies used book value of asset in their study as firm size. Myers & Majluf (1984) suggested that capital structure can influence market valuation because of the risk measures. Hence, D/E also is taken into consideration.

Equation one: $$Q = \beta_0 + \beta_1 E_1 + \beta_2 S_2 + \beta_3 BVA_3 + \beta_4 D/E_4 + \beta_5 CR_5 + \beta_6 ROA_6 + \beta_7 G_7 + \epsilon$$

The second equation is the robustness test equation. Book value of asset has been replaced by Market Capitalization for robustness test.

Equation Two: $$Q = \beta_0 + \beta_1 E_1 + \beta_2 S_2 + \beta_3 MktCap_3 + \beta_4 D/E_4 + \beta_5 CR_5 + \beta_6 ROA_6 + \beta_7 G_7 + \epsilon$$

Similar to ROA, The Third and fourth regression equations are based on the individual effect of E and S pillars on Tobin's Q.

Equation three: $$Q = \beta_0 + \beta_1 E_1 + \beta_2 BVA_2 + \beta_3 D/E_3 + \beta_4 CR_4 + \beta_5 ROA_5 + \beta_6 G_6 + \epsilon$$

Equation Four: $$Q = \beta_0 + \beta_1 S_1 + \beta_2 BVA_2 + \beta_3 D/E_3 + \beta_4 CR_4 + \beta_5 ROA_5 + \beta_6 G_6 + \epsilon$$

3.5. Goodness to Fit

R^2 and Adjusted R^2 are statistical measurement tools that have been widely used by researchers in regression. In general terms what these two do is test the goodness to fit of the model meaning how much of the variation in dependent variables is explained by the independent variables. On the other hand, Adjusted R^2 provides us how adding more variables can increase R^2, even if the variables are not meaningful. It can also decrease if the added information does not improve the model. Usually, higher R^2 and adjusted R^2 are better sign for the model as it the variation of the dependent variable is well explained by the independent variables. However, having a low R^2 or adjusted R^2 does not mean the model in not appropriate to use. Rather, it should be examined with more scrutiny where the quality and quantity and data availability are also important.

When we ran the regressions for financial performance (ROA), the R-squared value is 0.3729. That means that the model successfully explains 37.3% variance of ROA. It is a moderate level of goodness to fit value. When compared with previous studies it seemed consistent. For example, a lot of previous studies have found that pillars from ESG can explain the variations of financial performance, however, other firms specific factors, industry trends and other macroeconomic variables also play a significant role (Friede, Busch, & Bassen, 2015).

When compared with the Robust variable model, it is found that the model improves slightly where the R-squared value becomes 0.3826 meaning that 38.3% of the variance is explained by the variables. As market capitalization is a more dynamic reflection of firm size and investors perception. Many previous studies have found that the larger firms might be able to enjoy higher financial performance due it's economies of scale and better competitive positioning (López, Garcia, & Rodriguez, 2007).

In terms of the firm value, the base model consists of R-squared value of 29.9%. It is a moderately low value. However, it is not uncommon in previous studies conducted by Servaes & Tamayo, 2013), in which they explained that there are other variables such as investor sentiment, market condition and

strategic decision making play a role in firm value. But in the Robust variable model of firm value, where market capitalization is added replacing book value of asset, the model's R-squared improves to 36.8%. This is consistent with the study conducted by (Guenster et al., 2011) where they found that the market-based variables can explain the firm size better than the accounting-based variables.

3.6. Multicollinearity

Multicollinearity refers to the problem where independent variables have collinearity in them, meaning they explain similar information on the dependent variables. Hence, the reliability of the model decreases. In this study VIF or variance inflation factor has been used. Since we have multiple dependent variables, VIF has been conducted twice on different dependent variables separately. When VIF test is conducted, a value over 10 is a sign of multicollinearity while a value below 5 is considered low to moderate multicollinearity (Kutner et al., 2005).

In our first model for financial performance (ROA), all the variables seem to have VIF values below 5 which is a good sign and defines very low multicollinearity. The highest values for VIF are seen in E and S factors which are close to 2.5. However, this level of multicollinearity is often normal for ESG research variables because ESG pillar variables often align with each other within firms (Choi & Wang, 2009). Regardless, all the VIF values remain in safe thresholds in our model that leads to better reliability of the coefficient estimates.

For the Firm value model, we get similar results. The highest value is 2.52, meaning there are very low or moderate but manageable correlation in the E and S variables. However, that does not pose any threat to the reliability of the model. This is also consistent with previous ESG literatures, where stating that Environmental and Social pillars can be related, however, their impact on firm value can be distinct while controlled with other financial variables (Servaes & Tamayo, 2013).
Hence, the results of VIF tests are not uncommon and high enough to distort the results. ESG pillars are expected to have some level of correlation, as environmental measures are often part of Social responsibly. Choi and Wang (2009) found in their study that E and S often work synergistically within firms however their individual effects can be determined when needed.

3.7. Heteroskedasticity

Whenever the variance of errors is not constant across observations, a model is considered to be heteroscedastic. However, a model must be homoscedastic to be optimal. Heteroskedastic can mitigate the efficiency of the OLS estimates. To test if the models suffer from heteroscedasticity, studentized Breusch-Pagan (BP) test was conducted on both accounting based (ROA) and market based (Q) regressions.

While running the test for ROA regression, we found the P-value to be way below the threshold .05 and heteroscedasticity is significant. That is an indication of presence of heteroscedasticity in the model. Hence the null hypothesis should be rejected. This could lead to biased standard error and t-statistic, thus misleading conclusion (Long & Ervin, 2000).

In terms of the market-based estimate, Tobin's Q, similar test results have been found. P-value was also below the threshold, indicating heteroscedasticity being present in the model.
To address heteroscedasticity, Robust standard Error was used. Robust standard errors are less sensitive to violation of heteroscedasticity. It makes estimates to be more reliable and constituent under the condition of heteroskedasticity (White, 1980). In many previous studies Robust Standard Error was used to mitigate the effect of heteroscedasticity. For example, Servaes and Tamayo (2013) used Robust Standard Error to deal with heteroscedasticity being present in their study of the relationship between CSR and Financial performance.

3.8. Robustness Variable Test

The idea of using robust tests in a study is to make sure if the model has consistency in results under different terms and assumptions. The goal is to find out whether the main results change if the model meets new conditions. Waddock & Graves (1997) have mentioned in their study how important the firm size is in terms of empirical research. Because not every firm has the same resources to invest in sustainability. This is where big and small firms have different roles to play. Even though most of our study was similar in terms of choosing variables to Waddock & Graves (1997), our robustness variable is Market capitalization. The reason behind choosing market capitalization replacing book value in terms of firm size is in our study we want to focus more on the current market perception and dynamics

into it. In a more recent study to understand the relationship between CSR and Financial performance, market capitulation was used a robust variable Zhou, G., & Wang, S. (2020). The goal was to make sure the results are not driven from accounting terms, but also to include market valuation of the firm.

3.9. Autocorrelation

Autocorrelations are particularly common when working with financial data, especially panel and time series data. It is a condition when the residuals of a regression model are correlated to each other. In terms of an OLS regression, it is a violation of one of the assumptions. For a model to be efficient and reliable it must be free from autocorrection. This often can lead to inefficient estimates and inflated errors. In previous studies while examining the relationship between CSR and Financial performance Waddock and Graves (1997) also found the presence of autocorrelation and dealt it with robust standard error to ensure more accurate results. In another study Godfrey (1978) stated that the presence of autocorrelations in financial models can lead to unrealistic P-values and inaccurate results. The Durbin-Watson (DW) test was used to identify the autocorrelation in our both models.

In general, DW value around 2 defines no autocorrelation and better models. But while conducting the test for financial performance measures (ROA) model, it was found that the DW value is 0.72743 which is way below the threshold and the P-value is way too small. This refers to the fact that the model is suffering from positive autocorrelation in the residuals of the model. Hypothesis testing can me inaccurate and have inflated t-statistic because of autocorrelation (Wooldridge, 2010).

For Tobin’s Q the DW statistic and p-values are even lower which indicates even stronger autocorrelation present in the model. This can lead to biased standard error and the residuals are not independent of themselves.

To adjust the autocorrelation and heteroskedasticity, one approach can be using the Generalized Least Squares (GLS). Many previous studies have utilized GLS to mitigate the effects of autocorrelation. In one study, it was stated that when the OLS assumptions are violated, GLS can adjust both autocorrelation and heteroskedasticity and provide more efficient estimates for the models (Greene, 2012).

3.10. Stationarity Assessment

For a time-series data to be stationary, the mean and variance must be constant over time. It is a critical requirement for financial time-series data, specifically involved with financial performance and firm value. If the data is not stationary that can reflect into an accurate regression result. The variables used can demonstrate stronger relationships than there are. Hence, to analyze accurate and meaningful relationships in financial and firm value data, the variables must be stationary. Augmented Dickey-Fuller (ADF) Test was conducted to ensure that the if data set is stationary or not.
For all the variables used in the models, ADF statistic seem to be lower than the critical value at 1% significance level. Moreover, the p-value is also below .01. Hence, it can be concluded that all of the variables are stationary.

This result is consistent with previous studies regarding ESG and financial performance and firm values. For example, Clarkson et al. (2011) stated the use of similar tests to check the stationarity of environmental and social practices and found that this being stationary is a necessary requirement to have a robust relationship between firm value and ESG. In another study Granger and Newbold (1974) stated that the non-stationary variables can distort the outcome of regression analysis.

Table 2: Overview of Tests

Tests	Test Purpose	Results
Augmented Dickey-Fuller (ADF) Test (All variables)	Stationarity	Stationary
Variance Inflation Factor (VIF)	Multicollinearity	No multicollinearity
Goodness to Fit	Overall Model Fit	Moderate explanatory power
Breusch-Pagan (BP) Test	Heteroscedasticity	Heteroscedasticity
Durbin-Watson (DW) Test	Autocorrelation	Autocorrelation
Robustness Check (Market Cap as Robust Variable)	Robustness Check	Significant improvement
Robust Standard Errors	Addressing heteroscedasticity	Adjustment of Heteroskedasticity

Note: This table consists of the tests that have been conducted to address Stationary, Multicollinearity, Heteroscedasticity, Autocorrelation and Robustness check.

4. Results and Discussion

In the following sections we will be discussing the results we have gathered from our analysis. There will be two different parts to answer our research question. The first part will discuss the descriptive statistics and correlation matrix followed by the second part which will mostly demonstrate the results to answer the four hypotheses we have constructed.

4.1. Descriptive Analysis and Correlation Matrix

The following table contains the descriptive statistic data for the main variables for the analysis which will include sample size, mean, median, standard deviation, min and max values, range, skewness and kurtosis.

Table 3: Descriptive Analysis

vars	n	mean	sd	median	min	max	range	skew	kurtosis
E	840	61.41	20.71	63.89	1.82	96.76	94.94	-0.51	-0.26
S	840	65.74	19.08	68.84	15.62	96.27	80.65	-0.66	-0.34
ES	840	63.58	18.66	67.14	9.89	95.34	85.46	-0.64	-0.22
ROA	840	0.09	0.06	0.08	-0.13	0.49	0.63	0.78	2.14
Q	840	2.25	2.73	1.61	0.36	44.93	44.57	8.89	111.61

From the table the E and S pillars have the highest means and medians 61.41 and 65.74 respectively while ROA and Tobin's Q have 0.09 and 2.25. Median values are higher than the mean values for all the variables except ROA which has a median of 0.06. While analyzing the standard deviations, it was found that E and S pillars have values of 20.71 and 19.08 which indicates diversity of responses. On the other hand, relatively less diversity has been found for ROA. However, Tobin's Q has a standard deviation of 2.73 which also a sign of great variability in firm values. Great variability was also found when evaluating the minimum and maximum values. For instance, E and S pillars have a minimum value of 1.82 and 15.62 respectively. In terms of maximum values, they reach 96.76 and 96.27 respectively. For ROA the minimum value of -0.13 points out negative return among firms while this range is also very high for Tobin's Q, having a range of 44.93.

In terms skewness, E and S both pillars demonstrate negative values of -0.51 and -0.66 meaning both are negatively skewed. That is an indication of more firms may have higher scores than the mean in the distribution. However, ROA is positively skewed with a value of 0.78 indicating a lower return among the firms than the mean. However, Tobin's Q has the highest positive skewness value of 8.89.

Kurtosis is a measure to identify whether a distribution is heavy, or light tailed. Whenever the value is more than 3, it's leptokurtic distribution and it's platykurtic when otherwise. In our analysis, all the kurtosis values are really close to zero which gives us an idea that the distribution is really close to a normal distribution for all the variables which make them platykurtic distributions. However, only Tobin's Q has a very high kurtosis of 111.61 which is a indication of leptokurtic distribution indicating that the shape of the distribution is affected by extreme values or outliers.

Table 4: Correlation Matrix - ROA

Cor. Matrix ROA	ROA	ES	E	S	BVA	DtoEQ	CR	MktCap
ROA	1							
ES	-0.082	1						
E	-0.123	0.943	1					
S	-0.026	0.933	0.759	1				
BVA	-0.039	0.212	0.236	0.159	1			
DtoEQ	0.15	0.065	0.022	0.104	-0.082	1		
CR	0.246	-0.371	-0.344	-0.352	-0.216	-0.137	1	
MktCap	0.305	0.109	0.104	0.101	0.635	-0.014	-0.043	1

Note: Above table provides the correlation matrix among all the Return on Asset, Environmental, Social, Book Value of asset, Debt/Equity, Current Ratio and Market capitalization for ROA

The above correlation matrix provides us with the correlation values for all the independent, dependent and control variables. From the table it can be observed that both the independent variables E and S pillars are negatively correlated with our dependent variable ROA with values of -0.123 and -0.026 respectively. However, they both are highly correlated with each other with 0.759. All the control variables are also positively correlated with our dependent variable, ROA except Book value of asset. It

is also observed that all the control variables also maintained a positive correlation with independent variable E and S. However, the only exception in this case was observed for current ratio which has a negative correlation of -0.344 and -0.352 with E and S respectively.

Table 5: Correlation Matrix - Q

Cor. Matrix Q	Q	ES	E	S	BVA	DtoEQ	CR	ROA	G	MktCap
Q	1									
ES	0.009	1								
E	-0.001	0.943	1							
S	0.018	0.933	0.759	1						
BVA	-0.053	0.212	0.236	0.159	1					
DtoEQ	0.076	0.065	0.022	0.104	-0.082	1				
CR	0.25	-0.371	-0.344	-0.352	-0.216	-0.137	1			
ROA	0.525	-0.082	-0.123	-0.026	-0.039	0.15	0.246	1		
G	0.004	-0.004	-0.008	0.001	0.058	-0.006	0.051	0.028	1	
MktCap	0.399	0.109	0.104	0.101	0.635	-0.014	-0.043	0.305	0.054	1

Note: Above table provides the correlation matrix among all the Tobin's Q, Environmental, Social, Book Value of asset, Debt/Equity, Current Ratio, Return on asset, Growth and Market capitalization for Tobin's Q

While analyzing the correlation matrix for firm value variable, Tobin's Q, we found similar results. However, while E pillar still remained negative with a value of -0.001, S pillar on the other hand showed positive correlation of 0.018 which was not the case with ROA. All the control variables also show positive correlation with Tobin's Q, except Book value of asset. ROA and Growth are also added as control variables for Tobin's Q and they both have positive correlation of 0.525 and 0.004. Our robust variable Market Capitalization also maintained a positive correlation with Tobin's Q with a value of 0.399.

4.2. Regression Analysis

This section will analyze all the regression analysis models to help understand the relationship between our independent variable, environmental and social pillars, and our dependent variables, return on asset

and Tobin's Q. Later in the section the relationships will be discussed to find answers for our hypotheses 1-4.

4.2.1. Environmental and Social Pillars and Corporate Financial Performance

This section discusses Environmental and Social Pillars and Corporate Financial Performance, which in our case in return of asset, ROA.

Hypothesis 1: Strong environmental and social practices (E and S) lead to improved financial performance

Table 6: Environmental and Social pillar on Financial Performance: ROA

Variable (Base Model)	Estimate
Intercept	0.05617*** (0.00966)
E	-0.00057*** (0.00016)
S	0.00063*** (0.00017)
BVA	5.38e-14 (3.65e-14)
DtoEQ	0.00285*** (0.00054)
CR	0.01184*** (0.00150)
R-squared	0.1122
Adj. R-squared	0.1069
Residual Std. Error	0.06067
F-statistic	21.08***
Observations	834

Note: This table is the representation of OLS regression analysis between Return on Asset and E and S scores which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

The first regression model was based on Environmental (E) and Social (S) pillars and their relationship with financial performance (ROA). The independent variables being E and S and the control variables Book Value of Asset (BVA), Debt to Equity (DtoEQ) and Current Ratio (CR). The results meet the expectations of many previous studies that have been conducted over time.

The intercept is 0.05617 and it is also significant at 1% level (***). This means that even if there are no independent variables the firm may have an ROA of 0.05617. That is not practical in real life

however, it defines the relationship between other independent variables with ROA. The Environmental pillar (E) has a coefficient of -0.00057 which also has a strong significance level at 1%. This poses a negative relationship with ROA meaning if E increases ROA must decrease 0.00057. Even though it is expected that better environmental practices might reduce cost and provide better financial performance (Porter & van der Linde, 1995), this might give an idea of how these environmental approaches related to higher initial cost which might derail a firm to enjoy immediate financial returns. On the other hand, social pillar (S) has a positive coefficient of 0.00063 and significant at 1% level meaning a firm might be able to enjoy better financial return with better social practices. Even in some prior research it was found that firms with better social practices enjoy better financial performance (Margolis & Walsh, 2003). While the only insignificant variable being Book Value of Asset (BVA), Current Ratio and D/E ratio both are very significant in the regression. It is understandable that the BVA might not be significant because the impact of asset valuation and financial performance may be varied within industries (Chung & Pruitt, 1994). D/E on the other hand is significant with a coefficient of 0.00285. that also aligns with the notion that leveraging can amplify financial performance if managed effectively (Modigliani & Miller, 1958). The last independent variable current ratio (CR) has also a positive and significant relationship with ROA with a coefficient of 0.01184. It is an expected relationship because liquidity is a crucial element for financial health (Khan & Jain, 2011). The R-squared and adjusted R-squared values are 11.2% and 10.6%. This is the indication of how well the model explained by the independent variables. Even though they are relatively low, this is common while working with financial data and models. Because there might be countless variables that can have an influence on the ROA than the variables captured (McFadden, 1974).

Table 7: Environmental and Social pillar on Financial Performance: ROA (Robust Standard Errors)

Variable	Estimate	(Robust SE)
Intercept	0.05617*** (0.00966)	-0.01219
E	-0.00057*** (0.00016)	-0.00014
S	0.00063*** (0.00017)	-0.00016
BVA	5.38e-14 (3.65e-14)	-4.73E-14

DtoEQ	0.00285*** (0.00054)	-0.00067
CR	0.01184*** (0.00150)	-0.00302
R-squared	0.1122	
Adj. R-squared	0.1069	
Residual Std. Error	0.06067	
F-statistic	21.08***	
Observations	834	

Note: This table is the representation of OLS regression analysis between Return on Asset and E and S scores which also includes control variables. Provided standard error in parentheses with Robust Standard errors. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

This model has the same independent variables as the base model. However, the main difference between both is that Robust Standard Error are used to address and account for heteroskedasticity. Robust Standard Error are used to account for potential issues of heteroskedasticity. Heteroskedasticity is when the variance of the error term is not constant across observations. Robust Standard Error can ensure more accuracy to the model when heteroskedasticity is detected in tests. In the base model the environmental pillar (E) had a coefficient of a negative 0.05617 with significant at 1% level. In the robust standard error model, it remains the same. However, the only difference here is the standard error values. This increases from .00016 to .00014. This implies that, even if the model accounts for heteroskedasticity, the Environmental factor remain the negative relationship with the ROA. Similar results go for social pillar (S). While the coefficient and the significance level remain same of the standard error changes slightly from 0.00017 to 0.00016. This concludes that even after adjusting heteroskedasticity the social pillar (S) holds a positive relationship with the ROA, thus financial performance. In terms of Book Value of Assets, it remains insignificant in both models implying that BVA might not have a strong impact on ROA or financial performance. This aligns with previous study done by Waddock and Graves (1997), where they have found that asset size may not have a direct and linear relationship with profitability, in our case ROA. On the contrary, D/E and CR both ratios remain unchanged and significant even after dealing with heteroskedasticity in Robust standard errors model. That leads to a strong positive and significant relationship with liquidity and leverage with financial profitability.

This Robust SE model is more reliable and accurate as it addresses and adjusts heteroskedasticity. In Both the models, the consistency coefficients and significance levels hold the same and the impact of main independent variables E and S do not change. While better social practices can improve financial performance in the short run, environmental initiatives like green initiatives may incur high initial costs (Filbeck and Gorman, 2004). In another study Margolis and Walsh (2003) found that while this environmental investment can hamper short term profits, they could generate long term advantages.

Table 8: Environmental and Social pillar on Financial Performance: ROA (Robustness Variable Model, Market Capitalization)

Variable	Estimate
Intercept	0.05773***
E	-0.000594***
S	0.0005594***
MktCap	1.045e-13***
DtoEQ	0.002876***
CR	0.01155***
R-squared	0.2125
Adj. R-squared	0.2077
Residual Std. Error	0.05714
F-statistic	45.00***
Observations	834

Note: This table is the representation of OLS regression analysis between Return on Asset and E and S scores which also includes control variables and Robustness variable Market Capitalization. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

To enhance the comprehensiveness and reliability of the results, we have conducted a robustness variable model with the same variable only replacing the Book value of Asset with Market capitalization. By adding Market Capitalization, we expect to account for more dynamic market-based measures. In their prior study Cohen, J., & Simons, T. (2017), discussed how market size can influence the financial performance considering better resources and operational efficiencies. J., & Serafeim, G. (2019) included market capitalization as their firm size robustness variable in their study as market capitalization has market dynamics and perceptions.

In the robustness variable model, almost all the relationships have the same impact on the financial performance. Environmental pillar (E) remains negative with a coefficient of -0.000594 and same significance level while social pillar (S) still holds a positive relationship with estimate 0.000559 and significant at 1% level. This result aligns with previous studies mentioning that social engagement can bring better financial performance Eccles et al. (2014) and Friede et al. (2015). While D/E and CR ratios remain close and significant to our base model, Market capitalization makes a big difference. Market capitalization defines a strong influence on financial performance, ROA with great significance level. It is expected for larger firms to have advantages in resources and market influences which later can potentially impact positively to implement better ES practices (García-Sánchez et al., 2019). Along with that the overall R-Squared and Adjusted R-Squared values also improve to 21.2% and 20.7% which indicate better explanatory power for the model. This concludes that incorporating Market Capitalization as firm size allows to have a better comprehensive view of the model influencing ROA. While most of the coefficient and significance level of the variables remains same, proves robustness of the relationship between of the variables across different conditions.

Hypothesis 3: Environmental and Social, both pillars have independent and significant impact on Firm's financial performance

Table 9: Environmental Pillar on ROA

Variable	Estimate
Intercept	0.07295***
E	-0.0001446
BVA	4.799E-14
DtoEQ	0.003067***
CR	0.01108***
R-squared	0.09791
Adj. R-squared	0.09359
Residual Std. Error	0.06112
F-statistic	22.66***
Observations	835

Note: This table is the representation of OLS regression analysis between Return on Asset and E score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

To analyze the relationship between ROA and standalone effect of Environmental pillar (E), another model was constructed without social pillar (S). In this model, we have regressed Financial performance (ROA) with only Environmental pillar (E) and other control variables Book value of asset, D/E ratio and Current Ratio. In this model the coefficient for E turns out to be -0.0001446 which implies a negative relationship with ROA as the base model. However, it shows a statistically insignificant estimate indicating that the E might not have a meaningful influence on financial performance, ROA without the social pillar. Along with that the standard error is 0.06112 and R-squared value is relatively low of 0.09791 which means that only 9.79% of the variability of the ROA is explained by this model. King and Lenox (2001) in their study suggested that even if environmental performance is related to operational efficiency, the direct impact of this is not always reflected in financial performance, such as ROA when measured individually. Waddock and Graves (1997) also found in their study of Corporate social responsibility and financial performance that while social and governance pillar may exhibit a positive significant relationship with financial performance, Environmental pillar can have a negative impact, even a statistically insignificant when considered independently.

While remains insignificant, Book Value of Asset shows it does not have a meaningful impact on ROA either which translates having higher book value of asset does not necessarily mean that a firm might have the potential to enjoy better financial performance. On the other hand, CR has a coefficient of 0.01108 which is also significant at 1% level. This is an indication that better short-term liquidity management can provide better financial gains for the firm in the short run. In terms of D/E ratio, it maintains a significant positive relationship with a coefficient of 0.003067. This helps us to understand that firms with higher leverage relative to equity may be able to enjoy better financial gains. Even though this relationship is complex, there are some previous researches that supports this conclusion. For example, in one study Eccles et al. (2014) stated that while firms may have adopted robust environmental practices often experienced its benefit in the long run, however the immediate outcome was unclear. In another study Porter and van der Linde (1995) suggested that even if the environmental regulations can cause high initial costs, it can drive firms for better innovation which can lead to better profitability in the long run.

Table 10: Social Pillar on ROA

Variable	Estimate
Intercept	0.04995***
S	0.0001838
BVA	3.405E-14
DtoEQ	0.003012***
CR	0.01242***
R-squared	0.09863
Adj. R-squared	0.09431
Residual Std. Error	0.06109
F-statistic	22.84***
Observations	835

Note: This table is the representation of OLS regression analysis between Return on Asset and S score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

In this model, instead of Environmental pillar only social pillar was considered to find out the impact of social practices on financial returns (ROA). After running the regression results, it can be found that while social pillar may have a positive coefficient of 0.0001838, it becomes statistically insignificant. That implies, when considered individually, that social pillar does not have a meaningful influence on financial performance, ROA. Ruf et al. (2001) found in his study that when isolated ESG pillars, such as social practices may become insignificant and not demonstrate a strong impact on financial measures. However, variables like D/E and Current Ratios are highly significant with coefficients 0.003012 and 0.01242 respectively. As like previous models, it implies that firms with higher liquidity and leverage enjoy better financial performance. Book Value of Assets, on the other hand, remains insignificant also in this model. Overall weak significance in the regression model of S pillar implies that, the immediate outcome of social practices might not be visible in the financial performance measures. However, when combined with other ESG variables, this may have a significant role to play in firms' financial performance, such as ROA.

4.2.2. Environmental and Social Pillars and Firm Value

In this section the relationship between Environmental and Social pillars and Firm valuation will be discussed.

Hypothesis 2 : Strong environmental and social practices (E and S) lead to increased firm value

Table 11: Environmental and Social pillar on Firm Value (Tobin's Q)

Variable (Base Model)	Estimate
Intercept	-1.267*** (0.3714)
E	0.01660** (0.006052)
S	-0.0004819 (0.006532)
BVA	-1.11e-12 (1.382e-12)
DtoEQ	0.01404 (0.02053)
CR	0.2993*** (0.05864)
ROA	21.10*** (1.305)
G	-0.01192 (0.02141)
R-squared	0.3052
Adj. R-squared	0.2994
Residual Std. Error	2.286
F-statistic	52.22***
Observations	834

Note: This table is the representation of OLS regression analysis between Tobin's Q and E and S scores which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

The base model examines the relationship between firm value which in our case Tobin's Q and environmental and social practices, along with several other control variables such as book value of assets, debt to equity ratio, liquidity ratio, return on assets, and growth of revenue. The goal is to see if the environmental and social pillars of ESG can have an influence on firms' valuation.

First it can be seen that the intercept is negative with a value of (-1.267) and statistically significant, which implies that firms might be undervalued with no environmental and social practices along with other financial metrics. The environmental pillar has a positive coefficient of 0.01660 with p-value of 0.006231 which makes the E statistically significant as well. This is an indication of E contributing positively when firms value when it is accounted by Tobin's Q. These results are similar that are found in past studies conducted by Clark et al. (2015) and Nguyen et al. (2018). These studies suggested that the environmental initiatives positively affect the firm's valuation. Albuquerque et al. (2019) also

pointed out the robust environmental practices have a positive relationship with firm valuation. On the other hand, social pillar (S) does have a negative relationship with Tobin's Q with a coefficient of -0.0004819. However, it is not statistically significant with a p-value 0.941204. This suggests that the social pillar does not have a strong effect on the firm's valuation. The reason behind it may have been that investor value better environmental practices over the social initiatives introduced by the firms. This aligns with some of the previous studies. For instance, Margolis & Walsh (2003) found in their research that social pillar does not demonstrate a strong effect on the firm's value. While the book value of assets and D/E ratio both are positive but statistically insignificant, our added variable ROA is highly significant with a positive coefficient of 21.10. This indicates that profitability has a strong positive impact on the firm's valuation. This concludes that the more profitable a firm is the higher firm value is expected. Our last control variable growth also has a negative relationship with a coefficient of -0.01192. However, it is also not statistically significant, meaning growth does not have a strong immediate effect on Tobin's Q when compared to other variables such as return on assets and current ratio. R-squared and adjusted R-squared values are 0.305 and .299 respectively meaning that the model has an explanatory power of 30.5% and 29.9% respectively. Along with that the F-statistic value is also significant explaining that the model is statistically significant itself.

Table 12: Environmental and Social pillar on Firm Value: Tobin's Q (Robust Standard Errors)

Variable	Estimate	(Robust SE)
Intercept	-1.267*** (0.3714)	0.7432
E	0.01660** (0.006052)	0.00558
S	-0.0004819 (0.006532)	0.00535
BVA	-1.11e-12 (1.382e-12)	7.53E-13
DtoEQ	0.01404 (0.02053)	0.01469
CR	0.2993*** (0.05864)	0.13787
ROA	21.10*** (1.305)	2.5864
G	-0.01192 (0.02141)	0.00888
R-squared	0.3052	
Adj. R-squared	0.2994	
Residual Std. Error	2.286	
F-statistic	52.22***	

Observations	834	

Note: This table is the representation of OLS regression analysis between Tobin's Q and E and S scores which also includes control variables. Provided standard error in parentheses with Robust Standard errors. * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

This Robust SE model takes into consideration heteroskedasticity and autocorrelation which makes the accuracy of the whole model better. This ensures the model's coefficients are more reliable and statistical significance is accurately reflected. This ensures the significance level of the coefficients are not over or underestimated. One example can be without this Robust standard model, the significance of environmental pillar can be skewed and artificially stronger or weaker than it actually is. Wooldridge (2010) and Greene (2012) both stated that the robust standard error can increase the validity statistically to the model. They also emphasized that robust standard error would be sued especially when there is heteroskedasticity present in the model.

In our model, the Environmental pillar (E) is statistically significant at 1% level with a coefficient of 0.00488 which aligns with our base model. This makes our results more reliable than only based on our base model. The social pillar remains insignificant as it was in our base model. Other variables such as current ratio and return on asset also remain significant at 5% and 0.1% respectively, adding more validity in our results.

Table 13: Environmental and Social pillar on Firm Value: Q (Robustness Variable Model, Market Capitalization)

Variable	Estimate
Intercept	-1.053e+00 (0.3520) ***
E	1.129e-02 (0.0057) *
S	2.673e-04 (0.0062)
MktCap	3.868e-12 (4.055e-13) ***
DtoEQ	3.182e-02 (0.0195)
CR	3.606e-01 (0.0551) ***
ROA	1.679e+01 (1.316) ***
G	-2.332e-02 (0.0203)
R-squared	0.3732
Adj. R-squared	0.368

Residual Std. Error	2.171
F-statistic	70.78 ***
Observations	834

Note: This table is the representation of OLS regression analysis between Tobin's Q and E and S scores which also includes control variables and Robustness variable Market Capitalization. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

To check the robustness of the relationship, in our Robustness variable we have replaced book value of asset with market capitalization. Market capitalization is a better measure to capture the dynamics of the market with investors' perception and overall market sentiment of the firms. Market capitalization is a significant measure for the evaluation of a firm's value because the market's perception can fluctuate based on many external factors such as ESG initiates (El Ghoul et al., 2011). Along with that Brammer & Millington (2008) suggested in their study that market capitalization has a better correlation with capital and resources which can facilitate more investments and finally better financial performance and reputation.

In our robustness variable model, environmental pillar E remains positive with a coefficient of 0.01129 and statistical significance of 5%. It still maintains a similar relationship as it was in our base model. However, the magnitude is slightly different. As for the social pillar S also remains insignificant like the base model even though it becomes negative with a coefficient of 0.0002673. Market capitalization, on the other hand, is strong positive and highly statistically significant in our robust variable model. This is an indication of market capitalization playing an important role when it comes to firms' valuation, especially Tobin's Q. The R-squared value also significantly increased in our robust variable model. In our base model it was .305. However, when we added market capitalization it increased to 0.3732. It explains the higher proportion of the variance of our dependent variable, Tobin's Q, is explained by our robustness variable model. The F-statistic also increased to 70.78 from 52.22, indicating a robust fit of the overall model. Hence, the robustness variable model improves the overall fit and provides validity to our previous findings as the relationships do not change significantly even with the replacement of the control variable.

Hypothesis 4 : Environmental and Social, both pillars have independent and significant impact on Firm's value

Table 14: Environmental pillar on Tobin's Q

Variable	Estimate
Intercept	-1.279*** (0.334)
E	0.01627*** (0.00413)
BVA	-1.105e-12 (1.380e-12)
DtoEQ	0.01391 (0.02044)
CR	0.3000*** (0.05779)
ROA	21.08*** (1.294)
G	-0.01195 (0.02139)
R-squared	0.3052
Adj. R-squared	0.3002
Residual Std. Error	2.285
F-statistic	60.99***
Observations	834

Note: This table is the representation of OLS regression analysis between Tobin's Q and E score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Like financial performance (ROA), to analyze the standalone effect of Environmental to Tobin's Q, another model is constructed only with E variable along with the control variables. This model suggests that there is a strong relationship between firms' environmental disclosure and firm value even when the ESG pillars are dissected from each other. The E variable has an estimate of 0.01627 which is also statistically significant. Hence, it can be concluded that a better environmental score independently can positively influence the firm's valuation. This aligns with much of the previous research. For instance, in his study Clarkson et al. (2011) found that better environmental scores tend to improve firms value by mitigating the risks and providing reputation. This result is also supported by a study done by López, Garcia, and Rodriguez (2007) where they found a significant positive relationship with E pillar and Tobin's Q even when the E pillar is isolated from others. While E pillar being significantly positive, other variables such as BVA and D/E ratios are not significant in this model aligning with prion models. On the other hand, current ratio and return on asset are positive and significant like the

base model meaning they can enhance the firm value measured by Tobin's Q. The R-squared and adjusted R-squared values are .305 and .300. That defines the model also has good explanatory power by the variables.

Table 15: Social Pillar on Tobin's Q

Variable	Estimate
Intercept	-1.064** (0.365)
S	0.013** (0.004)
BVA	-0.000 (0.000)
DtoEQ	0.011 (0.021)
CR	0.288*** (0.059)
ROA	20.660*** (1.300)
G	-0.013 (0.021)
R-squared	0.2989
Adj. R-squared	0.2939
Residual Std. Error	2.295
F-statistic	59.2***
Observations	834

Note: This table is the representation of OLS regression analysis between Tobin's Q and S score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

This table examines the relationship between standalone impact of Social Pillar (S) with the firm value, Tobin's Q. In this table the S pillar is positive with a coefficient of 0.013 which is also statically significant. Hence, provide the idea that social disclosure, even when isolated from other ESG variables, in firms has a strong positive impact on firms' overall valuation. This relationship aligns with some previous studies conducted. From example, Servaes and Tamayo (2013) found similar positive relationship between these variables when S pillar was isolated from others. They suggested that social practices can boost firms' valuation, especially in industries with high customer awareness. In another study Fatemi, Fooladi, and Tehranian (2015) suggested that standalone S pillar can enhance market valuation variable Tobin's Q in consumer-facing industries. Other variables such as D/E ratio and Book Value of Asset remain insignificant in the model. However, Current Ratio and Return on Asset continue to be significant and maintaining a positive relationship with Tobin's Q referring to high

liquidity and profitability enhances firm value. The R-squared and Adjusted R-squared also have 29.9% which demonstrates good explanatory power of the model.

4.3. Robustness Test

All the previous sections discussed models based on Ordinary Least Squares to examine the relationship between Environmental and Social Pillar with Firms Financial Performance and Firm Value. However, after running the Breusch-Pagan and Durbin-Watson tests for heteroscedasticity and autocorrelation were detected. That is a violation of OLS assumption of homoskedasticity and no autocorrelation. Hence, to tackle these violations Generalized Least Squares (GLS) was considered. GLS transforms the dataset into new models that satisfies OLS assumptions by accounting heteroskedasticity and autocorrelation. GLS has been used in many previous research which is similar to our research. For instance, Bae et al. (2018) has applied GLS in their study to correct the effect of heteroskedasticity and autocorrelation while explaining the relationship between ESG and Tobin's Q. They suggested that GLS is an important tool to improve the models' estimates accuracy when dealing with financial data which often demonstrates these violations. In another study Friede et al. (2015) found GLS are essential to more accurate estimates when examining the effect of ESG pillars on firms' performance. Thus, General Least Squares (GLS) was taken into consideration to provide robust financial modelling.

4.3.1. GLS Models for Financial Performance

Table 16: GLS Model - Environmental and Social pillars on Financial Performance: ROA

Variable	GLS Estimate (Std. Error)
Intercept	0.056172*** (0.009660)
E	-0.000569*** (0.000159)
S	0.000630*** (0.000172)
BVA	0.000000 (0.000000)
DtoEQ	0.002848*** (0.000536)

CR	0.011842*** (0.001498)
Statistic	**Value**
AIC	-2189.025
BIC	-2155.941
logLik	1101.512
Residual Error	0.060668
Observations	840 total; 834 residual

Note: This table is the representation of GLS regression analysis between ROA and E and S score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 17: GLS Model - Environmental and Social pillars on Financial Performance: ROA (Robust Variable model, Market Capitalization)

Variable	**GLS Estimate (Std. Error)**
Intercept	0.057725*** (0.009044)
E	-0.000594*** (0.000148)
S	0.000559*** (0.000162)
MktCap	0.000000 (0.000000)
DtoEQ	0.002876*** (0.000502)
CR	0.011550*** (0.001392)
Statistic	**Value**
AIC	-2286.504
BIC	-2253.42
logLik	1150.252
Residual Error	0.05714
Observations	840 total; 834 residual

Note: This table is the representation of GLS regression analysis between ROA and E and S scores which also includes control variables and Robustness variable Market Capitalization. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 18: GLS model - Environmental pillar on ROA

Variable	GLS Estimate (Std. Error)
Intercept	0.072945*** (0.008570)
E	-0.000145 (0.000110)
BVA	0.000000 (0.000000)
DtoEQ	0.003067*** (0.000536)
CR	0.011083*** (0.001495)
Statistic	**Value**
AIC	-2193.192
BIC	-2164.827
logLik	1102.596
Residual Error	0.061118
Observations	840 total; 835 residual

Note: This table is the representation of GLS regression analysis between ROA and E score which also includes control variables.

Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 19: GLS model - Social pillar on ROA

Variable	GLS Estimate (Std. Error)
Intercept	0.049952*** (0.009568)
S	0.000184 (0.000119)
BVA	0.000000 (0.000000)
DtoEQ	0.003012*** (0.000538)
CR	0.012420*** (0.001500)
Statistic	**Value**
AIC	-2194.009
BIC	-2165.645
logLik	1103.005
Residual Error	0.061093
Observations	840 total; 835 residual

Note: This table is the representation of GLS regression analysis between ROA and S score which also includes control variables.

Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

4.3.2. GLS Model for Firm Value

Table 20: GLS Model - Environmental and Social pillars on Firm Value: Tobin's Q

Variable	GLS Estimate (Std. Error)
Intercept	-1.267221*** (0.3714435)
E	0.016595** (0.0060515)
S	-0.000482 (0.0065320)
BVA	0.000000 (0.0000000)
DtoEQ	0.014040 (0.0205301)
CR	0.299251*** (0.0586387)
ROA	21.095420*** (1.3049369)
G	-0.011921 (0.0214111)
Statistic	**Value**
AIC	3869.972
BIC	3912.486
logLik	-1925.986
Residual Error	2.286147
Observations	840 total; 832 residual

Note: This table is the representation of GLS regression analysis between Tobin's Q and E and S score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 21: GLS Model - Environmental and Social pillars on Firm Value: Tobin's Q (Robust Variable model, Market Capitalization)

Variable	GLS Estimate (Std. Error)
Intercept	-1.053451*** (0.3520048)
E	0.011289* (0.0056966)
S	0.000267 (0.0061964)
MktCap	0.000000*** (0.0000000)
DtoEQ	0.031822 (0.0194450)
CR	0.360616*** (0.0550987)
ROA	16.785305*** (1.3158820)
G	-0.023322 (0.0203140)

Statistic	Value
AIC	3786.608
BIC	3829.123
logLik	-1884.304
Residual Error	2.171368
Observations	840 total; 832 residual

Note: This table is the representation of GLS regression analysis between Tobin's Q and E and S scores which also includes control variables and Robustness variable Market Capitalization. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 22: GLS model - Environmental pillar on Tobin's Q

Variable	GLS Estimate (Std. Error)
Intercept	-1.279178*** (0.3340251)
E	0.016269*** (0.0041264)
BVA	0.000000 (0.0000000)
DtoEQ	0.013910 (0.0204419)
CR	0.299971*** (0.0577877)
ROA	21.083327*** (1.2938287)
G	-0.011952 (0.0213944)
Statistic	**Value**
AIC	3859.753
BIC	3897.553
logLik	-1921.876
Residual Error	2.284782
Observations	840 total; 833 residual

Note: This table is the representation of GLS regression analysis between Tobin's Q and E score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

Table 23: GLS model - Social pillar on Tobin's Q

Variable	GLS Estimate (Std. Error)
Intercept	-1.064281*** (0.3654190)
S	0.012614** (0.0044741)
BVA	0.000000 (0.0000000)
DtoEQ	0.010568 (0.0205711)
CR	0.287991*** (0.0587233)
ROA	20.657014*** (1.3001664)
G	-0.012805 (0.0214923)
Statistic	**Value**
AIC	3867.09
BIC	3904.89
logLik	-1925.545
Residual Error	2.295077
Observations	840 total; 833 residual

Note: This table is the representation of GLS regression analysis between Tobin's Q and S score which also includes control variables. Standard errors in parentheses * significant at 10% level, ** significant at 5% level, *** significant at 1% level.

While comparing the results achieved from these GLS models with our main analysis, the coefficient and the significance level remain approximately the same even after addressing the issues of heteroskedasticity and autocorrelation. Even though there are slight changes in values, they are very negligible. Hence, the results from our analysis are robust and reliable.

4.4. Main Results

The following section provides the discussion about the main result we have found from all our OLS regression analysis as we as robust test GLS analysis. We will try to observe the relationship first and then try to incorporate these ideas into our hypotheses. Moreover, we will go deeper to try to understand why the variables are reacting to each other in this way and how the implications can be from a practical sense.

The following table shows the final findings for this study when incorporating all our hypotheses.

Table 24: Summary of Regression Results

No	Hypothesis	Results
1	**Strong environmental and social practices (E and S) together lead to improved financial performance**	**Partially accepted**
2	**Strong environmental and social practices (E and S) together lead to increased firm value**	**Partially accepted**
3	**Environmental and Social, both pillars have independent and significant impact on Firm's financial performance.**	**Rejected**
4	**Environmental and Social, both pillars have independent and significant impact on Firm's value.**	**Accepted**

Note: This table demonstrates the hypothesis results

It is found that hypothesis 1 and hypothesis 2 are partially accepted as the results of our regression from OLS and GLS models showed mixed but similar relationships. For our hypothesis 1, while examining the relationship between Environmental and Social pillar (E and S), the results show environmental disclosure has a negative concern with ROA while social discourse possess a positive one both being statistically significant. This concludes that that social pillar from ESG disclosure improves the short-term financial performance (ROA) while environmental pillar weakens it. On the other hand, evaluating the results for our hypothesis 2, which is environmental and social pillars enhances firm value, Tobin's Q, we obtained results that are opposite. In our all our regression concerning this matter shows environmental pillar does have a strong positive and statistical impact in firm value variable Tobin's Q. However, S pillar remains insignificant in all the models. That implies that social practices may not have a strong influence on firm value, in our case Tobin's Q. Rather those finding can be an indication of environmental pillar may contribute to firms to add value in long-run, while social pillar being an influencer of short-term gains.

When environmental and social pillars are considered separately to examine individual effects of the variables, both become insignificant statistically to have a reasonable effect on financial performance, ROA. This implies that both variables, when isolated, might depend on a combination factor to have such an impact on financial performance. That leads to a rejection of our hypothesis 3. It can also be

observed form the results that the pillars can have the potential to have the financial performance impact when they can work alongside each other as a broader sustainability strategy which makes their ability to drive the desired outcomes interdependent. Even in practice focusing on only one dimension might not be a reasonable approach. For example, if a firm only focuses on environmental practices, then it may not experience any noticeable impact on financial performance as the social practices are important to meet the stakeholders' expectations. On the other hand, if the firm only emphasizes social dimensions, the long-term benefits of environmental initiatives might not be achieved. Hence, to have a real meaningful impact on financial performance, managing a robust sustainability strategy combining both dimensions is needed. When considering the individual model for social pillar on ROA, the coefficient still positive but becomes insignificant. This can be an indication of S pillar does not have a impact to effect short term profitability by itself without the environmental initiatives.

On the contrary, when firm value was considered, both environmental and social pillars showed positive and significant impact on Tobin's Q even when they were isolated. That leads us to accept our hypothesis 4 because both pillars are found to have an independent positive effect on firm value. In our regression based on environmental pillar only demonstrated that it has a strong positive impact on Tobin's Q. That could mean that investing in better environmental practices can enhance firm value by providing market reputation, mitigating risks and attracting environmentally aware investors and consumers. Even when social pillars were considered it showed the same individual effect on firm value as socially aware firms might have the potential to build trust among stakeholders such as employees, investors and community. However, when both variables were considered together in the previous regressions, social pillar seemed to have no meaningful impact on firm value. This could be due to the interaction between these variables. Environmental pillar might have the ability to dominate relationships as environmental efforts may have more tangible effects on firm value and make social pillar's impact less visible Deng, X., Kang, J.-K., & Low, B. S. (2013). But when they are considered separately both variables demonstrated meaningful individual impact on firm value.

These standalone impact results of firm value, Tobin's Q, differ from the similar regressions of financial performance, ROA. This can reflect short-term and long-term value creation. For example, ROA is a short-term financial profitability variable. Environmental initiatives might not bring any

immediate improvement on financial performance as these environmental initiatives as they don't improve operational efficiency rapidly and responsible for short-term costs which reduce profitability, even if they might provide favorable outcomes in the long run. On the other hand, social pillars may experience the lack of synergy factor environmental pillar. This can be the reason for E and S variables being insignificant when they are isolated. However, social initiatives may have more immediate benefits when put together with other variables, specially it's combination factor E. For instance, better work conditions and consumer trust can result in better workforce efficiency and larger sales which can drive better profitability in the short run. On other hand, Tobin's Q is a ratio that mostly considers long-term value creation and market perception. The market and investors might take these environmental and social initiatives as potential firm value drivers improving overall firm value. Even if E and S pillars may not improve short-term profitability, they can have a meaningful strong impact on overall firm value even when they are isolated.

A comprehensive understating can be obtained from the results and their relation to some of the economic theories we have discussed in the previous sections. While considering the relationship between environmental and social efforts and financial performance from our results, we can relate it to trade-off theory. The trade-off theory suggests that firms balance the cost and benefits of corporate events. The negative relationship between environmental pillar with ROA can be a sign of facing short-term expenses, such as regulatory body regulations, green investments and emission reductions, that the firms must bear which can negative effect the financial performance. However, the firms maybe reward in the long-run by operational efficiency and risk-mitigation. The difference is even though the firms are facing short-term costs the long-term benefits take time to be in effect. On the other hand, instrumental stakeholder theory suggests that firms can enjoy better financial benefits by managing their relationship with their stakeholders. Social pillar being positively related to ROA can be an example of that. For example, by maintaining a good relationship with the stakeholders and providing better employee welfare, social engagement and philanthropy, firms can experience immediate short-term gains. Moreover, factors such as employee satisfaction can mitigate turnover costs and improve productivity, which contribute to better financial performance for the firms. Along with that, we can also relate the outcomes with managerial opportunism hypothesis. For instance, managers may want to engage in environmental activities that are not for overall better financial performance, rather on their

personal reputation buildings of the management team and from pressure of external bodies which can harm the short-term financial factor ROA. In terms of positive/negative synergy hypothesis, a relationship with our results also can be seen. The negative relation with environmental pillar and a positive one with social pillar with financial performance can be a sign of firms not being able to focus on both equally due to probable resources demand which is an indication of negative synergy between them. The firms that try to focus on both heavily might face a diminishing return.

When we compare the result with firm value (Tobin's Q), we also can relate the outcomes with these economic theories. For example, the positive and significant relationship with environmental pillar and Tobin's Q can be aligned with the instrumental stakeholder theory. This relationship suggests that firms engaging in robust environmental practices may be rewarded by the market in terms of firm valuation. Stakeholders may perceive the firms with better environmental practices to be less risky and sustainable in the long run, which can result in improved firm value. Also, when we considered the trade-off theory, a significant relationship can be observed. For example, firms with better environmental disclosure can enjoy long-term benefits which helps boost overall market value of the firms, even though their encounter with short-term costs which also hampers the immediate profitability of firms. Stakeholders may see these environmental investments as a source of long-term sustainability and a good reputation with better profitability. Hence, higher market valuation. On the contrary, the social pillar being negative and significant can be an indication to not being a key driver of firm value which can be related with managerial opportunism hypothesis. According to this theory, managers are inclined to engage in social activities only based on self-serving and their own reputation. However, it does not necessarily contribute to the long-term firm value. In terms of positive/ negative synergies, a positive synergy can be observed in the environmental factor. This suggests that environmental efforts by firms may provide operational efficiencies, corporate innovations and better market reputations which can lead to higher firm value.

5. Conclusion

The following section discusses the conclusion, policy implications, further research scope and limitations of this study.

5.1. Conclusion

The main objective of this study is to observe and analyze the relationship between Environmental and Social pillar of ESG disclosure and financial performance which was determined by return on asset and Tobin's Q ratio. Specifically, segregating the effects particularly based on different hypotheses. This research also aims to provide a better understanding of the impact by decomposing the variables of ESG disclosure to further study the behavior of the variables.

This study concluded that there is a mixed and complex relationship between the environmental and social pillars and the financial performance of firms. After evaluating several models using OLS and GLS, significant relationships were found between our independent and dependent variables. Firstly, it was found that environmental pillar has a strong negative relationship with financial performance, ROA which may have been the reason for high initial cost that is needed to implement the sustainable initiatives. While these initiatives are costly which can reduce profitability, they may not have the potential to bring short-term benefits to firms and long-term gains may not be realized immediately. On the other hand, social practices have been found to be positively reflected in immediate financial performance due to it's potential to improve operational efficiency and stakeholder relationships which was supported by previous research in the previous sections. In terms of firm value, both the environmental and social pillars have showed a positive significant relationship with Tobin's Q. As Tobin's Q is a measure of long-term value creation and market perception, both the independent variables have the potential to demonstrate this favorable return by utilizing firms' reputation and time.

When decomposed, the environmental and social pillars demonstrated totally different results for financial performance and firm value. While both the pillars became insignificant when isolated for ROA, they remained positive and significant for Tobin's Q. As our earlier sections discussed, which may have been the reason for the combination or synergy factor between the pillars and short-term profitability. However, when they get enough time to materialize the effect can be noticed in value addition. That leads us to the conclusion that even focusing on one dimension may not introduce short-term profitability, they have the potential to bring longer-term meaningful impact for the firm.

5.2. Policy Implications

This research results provides so many valuable insights for the policymakers, business managers and even the regulatory authorities who are involved in corporate sustainability decisions. This study demonstrates that there are mixed results in terms of the impact of environmental and social impacts on financial performance and firm value, especially in the short-term and long-term. Hence the consideration of finding a balanced approach is vital to manage the short-term economic cost and long-term sustainability goals for firms.

As the research showed environmental initiatives are negatively related to short-term profitability, implementation of incentives such as subsidies, grants or even tax benefits can be introduced by the regulatory bodies to encourage better environmental practices among corporate firms as these initiatives put economic pressure in the short-run profitability. This approach can help the firms to combat the immediate financial stress of investing in green environmental initiatives and provide opportunities to achieve long-term sustainability benefits and goals. The policymakers and especially the business managers also should focus on the finding right balance of both practices if they want to convert expectations in practice as they have the combination factor in short-term.

It was also observed that the social aspects of ESG disclosure have a favorable impact on short-term return and long-term benefits. That is a clear indication of when firms value the shareholders and choose to be socially responsible, they can experience immediate favorable profitability due to better stakeholder relationships and operational efficiency and long-term value creation by market reputation and goodwill. Hence the government can design sustainable frameworks and business managers can take strategic decisions involving socially responsible spectrum, such as better working environments, community engagement or even improving stakeholder relationships, which have the potential to improve financial performance in short-run and benefit the society. However, it is also important that the policymakers encourage integrity and transparency in ESG disclosure on how the firms record and report it. This will build trust and help the stakeholders to make informed decisions regarding the companies.

5.3. Scope for Future Research

Further research can be done to see the impact of long-term and short-term effects of environmental and social initiatives on financial performance. The timeframe can aim for longer periods of time to observe whether such initiatives really can be materialized in the long run. Another interesting approach can be to see how this relationship holds for firms in developed and developing countries as in developed countries the SGD goals are not as relaxed as in developing countries. Moreover, we have chosen the industries which the effected by ESG regulations. It could also be an interesting idea to see how ESG affects firms in industries where ESG does not play as big role. Future research can also include the reverse relationship between financial performance and ESG disclosure to observe if better financial performance is also responsible for reaching better ESG disclosure. Finanly, further research can include non-financial aspects such as employee satisfaction, customer loyalty and investors sentiments to identify how ESG affects them.

5.4. Limitations

Even though this research overall has provided us with a lot of significant observations, while conducting the research we have faced some major limitations. Our main concern for this study was to identify the relationship between environmental and social initiatives' impact on financial ascpet of firms and we have only considered ROA and Tobin's Q for that. However, these two are not the only metrics that can define the financial health of firms. For example, other financial variables like ROE, Cash flow or even stock price impact can also reveal different outcomes of that matter. Another limitation we have observed when we reached our results of the regression is that we have focused on the data for the last ten years which is moderate timeframe to define a financial relationship. But to define a long-term relationship and materialize the initiatives of environmental and social pillars a longer time frame could have solved the problem. Along with that, the age and life cycle of firms as variables also could provide us deeper insights, as (Derwall,2007) had included such variables in their study. Although this study is mostly based on micro-economic factors, the financial health of firms is also majorly affected by the macroeconomic spectrums. It would have been interesting to see how the overall relationship works when such variables as inflation, economic condition and even industry culture are addressed. Lastly, in our research we have used ADF tests for stationarity testing, which is the most accurate approach for time-series data. Other tests such as Levin-Lin-Chu (2002) test would

be a more appropriate approach for panel data methods. However, some early influential studies did not use ADF tests and did not focus on the stationary and non-stationary issues yet found valuable insights in similar topics, such as the study by Cochran and Wood (1984). While this being a limitation, our results from OLS and GLS regressions remain robust and valid even though this stationary test could benefit our findings. As research is a learning process, this will be a major learning of using more precise econometric tool in future research opportunities.

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Appendix

TESTS

VIF ROA

```
E        S      BVA    DtoEQ       CR
2.481944 2.452867 1.098237 1.045736 1.210488
```

VIF Q

```
 E        S      BVA    DtoEQ       CR      ROA        G
2.520453 2.493276 1.106552 1.081183 1.305647 1.126522
1.008207
```

Sharpio ROA

```
Shapiro-Wilk normality test

data:  residuals_ROA
W = 0.96865, p-value = 1.866e-12
```

Sharpio Q

```
Shapiro-Wilk normality test

data:  residuals_Q
W = 0.47929, p-value < 2.2e-16
```

BP TEST ROA

```
studentized Breusch-Pagan test

data:  basemodel_ROA
BP = 78.83, df = 5, p-value = 1.474e-15
```

BP test Q

```
studentized Breusch-Pagan test


data:  basemodel_Q
BP = 38.82, df = 7, p-value = 2.115e-06
```

DW TESTROA

```
Durbin-Watson test


data:  basemodel_ROA
DW = 0.72743, p-value < 2.2e-16
alternative hypothesis: true autocorrelation is greater
than 0
```

DW Q

```
Durbin-Watson test


data:  basemodel_Q
DW = 0.60951, p-value < 2.2e-16
alternative hypothesis: true autocorrelation is greater
than 0
```

Stationary Test

Variable	Statistic	p-value
E	-5.773746	0.01
S	-5.885214	0.01
ES	-5.617849	0.01
ROA	-5.208791	0.01
Q	-7.260777	0.01
BVA	-5.565991	0.01
DtoEQ	-4.784446	0.01
CR	-4.713561	0.01
G	-9.390178	0.01
MktCap	-7.294306	0.01

Models for ROA

BASEMODEL ROA

```
Call:
lm(formula = ROA ~ E + S + BVA + DtoEQ + CR, data = mydata)
```

```
Residuals:
     Min       1Q   Median       3Q      Max
-0.24739 -0.03627 -0.00512  0.03107  0.37420

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.617e-02  9.660e-03   5.815 8.64e-09 ***
E           -5.690e-04  1.594e-04  -3.570 0.000377 ***
S            6.299e-04  1.719e-04   3.664 0.000264 ***
BVA          5.379e-14  3.655e-14   1.472 0.141480
DtoEQ        2.848e-03  5.358e-04   5.315 1.37e-07 ***
CR           1.184e-02  1.498e-03   7.903 8.59e-15 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.06067 on 834 degrees of freedom
Multiple R-squared:  0.1122,    Adjusted R-squared:  0.1069
F-statistic: 21.08 on 5 and 834 DF,  p-value: < 2.2e-
16
```

Robust variable model ROA

```
Call:
lm(formula = ROA ~ E + S + MktCap + DtoEQ + CR, data = mydata)

Residuals:
      Min        1Q    Median        3Q       Max
-0.242013 -0.032990 -0.003205  0.029636  0.236774

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  5.773e-02  9.044e-03   6.383 2.88e-10 ***
E           -5.945e-04  1.485e-04  -4.004 6.79e-05 ***
S            5.594e-04  1.619e-04   3.456 0.000577 ***
MktCap       1.045e-13  1.002e-14  10.422  < 2e-16 ***
DtoEQ        2.876e-03  5.019e-04   5.730 1.40e-08 ***
CR           1.155e-02  1.392e-03   8.300 4.17e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.05714 on 834 degrees of freedom
Multiple R-squared:  0.2125,    Adjusted R-squared:  0.2077
F-statistic:    45 on 5 and 834 DF,  p-value: < 2.2e-
16
```

Isolated E model

```
Call:
lm(formula = ROA ~ E + BVA + DtoEQ + CR, data = mydata)

Residuals:
     Min       1Q   Median       3Q      Max
-0.23849 -0.03840 -0.00437  0.03154  0.37830

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept)  7.295e-02  8.570e-03   8.512  < 2e-16 ***
E           -1.446e-04  1.103e-04  -1.312    0.190
BVA          4.799e-14  3.678e-14   1.305    0.192
DtoEQ        3.067e-03  5.364e-04   5.717 1.51e-08 ***
CR           1.108e-02  1.495e-03   7.413 3.02e-13 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.06112 on 835 degrees of freedom
Multiple R-squared:  0.09791,   Adjusted R-squared:  0.09359
F-statistic: 22.66 on 4 and 835 DF,  p-value: < 2.2e-
16
```

Isolated S model

```
Call:
lm(formula = ROA ~ S + BVA + DtoEQ + CR, data = mydata)

Residuals:
     Min       1Q   Median       3Q      Max
-0.24554 -0.03821 -0.00416  0.03151  0.37354

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 4.995e-02  9.568e-03   5.220 2.25e-07 ***
S           1.838e-04  1.189e-04   1.545    0.123
BVA         3.405e-14  3.638e-14   0.936    0.350
DtoEQ       3.012e-03  5.376e-04   5.604 2.85e-08 ***
CR          1.242e-02  1.500e-03   8.280 4.88e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 0.06109 on 835 degrees of freedom
Multiple R-squared:  0.09863,   Adjusted R-squared:  0.09431
```

```
F-statistic: 22.84 on 4 and 835 DF,  p-value: < 2.2e-
16
```

Models for Q

Base model Q

```
Call:
lm(formula = Q ~ E + S + BVA + DtoEQ + CR + ROA + G, data = mydata)

Residuals:
   Min     1Q Median     3Q    Max
-5.987 -0.743 -0.124  0.523 39.265

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.267e+00  3.714e-01  -3.412 0.000677 ***
E            1.660e-02  6.052e-03   2.742 0.006231 **
S           -4.819e-04  6.532e-03  -0.074 0.941204
BVA         -1.110e-12  1.382e-12  -0.803 0.422187
DtoEQ        1.404e-02  2.053e-02   0.684 0.494248
CR           2.993e-01  5.864e-02   5.103 4.14e-07 ***
ROA          2.110e+01  1.305e+00  16.166  < 2e-16 ***
G           -1.192e-02  2.141e-02  -0.557 0.577832
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.286 on 832 degrees of freedom
Multiple R-squared:  0.3052,    Adjusted R-squared:  0.2994
F-statistic: 52.22 on 7 and 832 DF,  p-value: < 2.2e-
16
```

Robust variable model Q

```
Call:
lm(formula = Q ~ E + S + MktCap + DtoEQ + CR + ROA + G, data = mydata)

Residuals:
   Min     1Q Median     3Q    Max
-7.194 -0.677 -0.063  0.494 35.033

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.053e+00  3.520e-01  -2.993  0.00285 **
E            1.129e-02  5.697e-03   1.982  0.04785 *
S            2.673e-04  6.196e-03   0.043  0.96560
MktCap       3.868e-12  4.055e-13   9.539  < 2e-16 ***
```

```
DtoEQ        3.182e-02  1.945e-02   1.636  0.10211
CR           3.606e-01  5.510e-02   6.545 1.04e-10 ***
ROA          1.679e+01  1.316e+00  12.756  < 2e-16 ***
G           -2.332e-02  2.031e-02  -1.148  0.25126
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.171 on 832 degrees of freedom
Multiple R-squared:  0.3732,    Adjusted R-squared:  0.368
F-statistic: 70.78 on 7 and 832 DF,  p-value: < 2.2e-
16
```

Isolated E Model

```
Call:
lm(formula = Q ~ E + BVA + DtoEQ + CR + ROA + G, data = mydata)

Residuals:
   Min     1Q Median     3Q    Max
-5.988 -0.741 -0.124  0.524 39.260

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.279e+00  3.340e-01  -3.830 0.000138 ***
E            1.627e-02  4.126e-03   3.943 8.74e-05 ***
BVA         -1.105e-12  1.380e-12  -0.801 0.423474
DtoEQ        1.391e-02  2.044e-02   0.680 0.496408
CR           3.000e-01  5.779e-02   5.191 2.63e-07 ***
ROA          2.108e+01  1.294e+00  16.295  < 2e-16 ***
G           -1.195e-02  2.139e-02  -0.559 0.576561
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.285 on 833 degrees of freedom
Multiple R-squared:  0.3052,    Adjusted R-squared:  0.3002
F-statistic: 60.99 on 6 and 833 DF,  p-value: < 2.2e-
16
```

Isolated S model

```
Call:
lm(formula = Q ~ S + BVA + DtoEQ + CR + ROA + G, data = mydata)

Residuals:
   Min     1Q Median     3Q    Max
```

```
-6.020 -0.752 -0.086  0.517 39.275

Coefficients:
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -1.064e+00  3.654e-01  -2.912  0.00368 **
S            1.261e-02  4.474e-03   2.819  0.00493 **
BVA         -5.156e-13  1.371e-12  -0.376  0.70688
DtoEQ        1.057e-02  2.057e-02   0.514  0.60758
CR           2.880e-01  5.872e-02   4.904 1.13e-06 ***
ROA          2.066e+01  1.300e+00  15.888  < 2e-16 ***
G           -1.280e-02  2.149e-02  -0.596  0.55148
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 2.295 on 833 degrees of freedom
Multiple R-squared:  0.2989,    Adjusted R-squared:  0.2939
F-statistic:  59.2 on 6 and 833 DF,  p-value: < 2.2e-
16
```

Robust Standard Error For Q

```
t test of coefficients:

               Estimate  Std. Error t value  Pr(>|t|)
(Intercept) -1.2672e+00  7.4318e-01 -1.7051  0.088544 .
E            1.6595e-02  5.8804e-03  2.8221  0.004884 **
S           -4.8193e-04  5.3498e-03 -0.0901  0.928242
BVA         -1.1101e-12  7.5263e-13 -1.4750  0.140604
DtoEQ        1.4040e-02  1.4688e-02  0.9559  0.339409
CR           2.9925e-01  1.3787e-01  2.1705  0.030250 *
ROA          2.1095e+01  2.5864e+00  8.1564 1.268e-15 ***
G           -1.1921e-02  8.8779e-03 -1.3428  0.179707
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1
‘ ’ 1
```

Robust Standard Error For ROA

```
t test of coefficients:

               Estimate  Std. Error t value  Pr(>|t|)
(Intercept)  5.6172e-02  1.2188e-02  4.6088 4.683e-06 ***
E           -5.6899e-04  1.4321e-04 -3.9732 7.705e-05 ***
S            6.2993e-04  1.6233e-04  3.8806 0.0001124 ***
```

```
BVA          5.3785e-14  4.7290e-14  1.1374 0.2557168
DtoEQ        2.8478e-03  6.6838e-04  4.2608 2.269e-05 ***
CR           1.1842e-02  3.0184e-03  3.9232 9.459e-05 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1
‘ ’ 1
```

GLS Models ROA

GLS_BASE MODEL ROA

```
Generalized least squares fit by REML
  Model: ROA ~ E + S + BVA + DtoEQ + CR
  Data: mydata
        AIC       BIC   logLik
  -2189.025 -2155.941 1101.512

Coefficients:
                   Value   Std.Error   t-value p-value
(Intercept)  0.05617199 0.009660225  5.814770  0.0000
E           -0.00056899 0.000159360 -3.570474  0.0004
S            0.00062993 0.000171932  3.663826  0.0003
BVA          0.00000000 0.000000000  1.471695  0.1415
DtoEQ        0.00284784 0.000535808  5.315041  0.0000
CR           0.01184153 0.001498329  7.903158  0.0000

 Correlation:
      (Intr) E      S      BVA    DtoEQ
E     -0.180
S     -0.474 -0.727
BVA   -0.109 -0.151  0.043
DtoEQ -0.097  0.086 -0.112  0.106
CR    -0.617  0.108  0.138  0.166  0.135

Standardized residuals:
        Min          Q1         Med          Q3         Max
-4.07768874 -0.59788854 -0.08434582  0.51215496  6.16793772

Residual standard error: 0.06066799
Degrees of freedom: 840 total; 834
residual
```

GLS Robustness variable model

```
Generalized least squares fit by REML
  Model: ROA ~ E + S + MktCap + DtoEQ + CR
  Data: mydata
        AIC      BIC   logLik
```

```
  -2286.504 -2253.42 1150.252

Coefficients:
                  Value   Std.Error   t-value p-value
(Intercept)  0.05772509 0.009043846  6.382804   0e+00
E           -0.00059446 0.000148480 -4.003629   1e-04
S            0.00055940 0.000161881  3.455598   6e-04
MktCap       0.00000000 0.000000000 10.422269   0e+00
DtoEQ        0.00287613 0.000501910  5.730375   0e+00
CR           0.01155030 0.001391613  8.299940   0e+00

 Correlation:
       (Intr) E      S      MktCap DtoEQ
E      -0.200
S      -0.472 -0.727
MktCap  0.000 -0.039 -0.035
DtoEQ  -0.086  0.103 -0.118  0.021
CR     -0.611  0.136  0.133  0.005  0.120

Standardized residuals:
        Min          Q1         Med          Q3         Max
-4.23547285 -0.57736333 -0.05609561  0.51865437  4.14378488

Residual standard error: 0.05713953
Degrees of freedom: 840 total; 834
residual
```

GLS for only E

```
Generalized least squares fit by REML
  Model: ROA ~ E + BVA + DtoEQ + CR
  Data: mydata
        AIC       BIC   logLik
  -2193.192 -2164.827 1102.596

Coefficients:
                  Value   Std.Error   t-value p-value
(Intercept)  0.07294502 0.008569622  8.512046  0.0000
E           -0.00014464 0.000110267 -1.311685  0.1900
BVA          0.00000000 0.000000000  1.304681  0.1924
DtoEQ        0.00306690 0.000536408  5.717480  0.0000
CR           0.01108278 0.001494947  7.413491  0.0000

 Correlation:
      (Intr) E      BVA    DtoEQ
```

```
E     -0.868
BVA   -0.101 -0.175
DtoEQ -0.171  0.007  0.112
CR    -0.633  0.307  0.162  0.153


Standardized residuals:
        Min          Q1         Med          Q3         Max
-3.90214363 -0.62822613 -0.07150285  0.51600936  6.18970681


Residual standard error: 0.06111765
Degrees of freedom: 840 total; 835
residual
```

GLS for only S

```
Generalized least squares fit by REML
  Model: ROA ~ S + BVA + DtoEQ + CR
  Data: mydata
        AIC       BIC   logLik
  -2194.009 -2165.645 1103.005


Coefficients:
                 Value   Std.Error  t-value p-value
(Intercept) 0.04995155 0.009568438 5.220449  0.0000
S           0.00018376 0.000118919 1.545268  0.1227
BVA         0.00000000 0.000000000 0.935912  0.3496
DtoEQ       0.00301240 0.000537564 5.603806  0.0000
CR          0.01241955 0.001500000 8.279698  0.0000


 Correlation:
      (Intr) S      BVA    DtoEQ
S     -0.895
BVA   -0.141 -0.098
DtoEQ -0.083 -0.072  0.121
CR    -0.611  0.317  0.186  0.127


Standardized residuals:
        Min          Q1         Med          Q3         Max
-4.01916144 -0.62540832 -0.06804252  0.51584009  6.11420069


Residual standard error: 0.06109329
Degrees of freedom: 840 total; 835
residual
```

GLS baemodel Q

```
Generalized least squares fit by REML
```

```
  Model: Q ~ E + S + BVA + DtoEQ + CR + ROA + G
  Data: mydata
       AIC      BIC    logLik
  3869.972 3912.486 -1925.986

Coefficients:
                Value Std.Error   t-value p-value
(Intercept) -1.267221 0.3714435 -3.411612  0.0007
E            0.016595 0.0060515  2.742340  0.0062
S           -0.000482 0.0065320 -0.073779  0.9412
BVA          0.000000 0.0000000 -0.803029  0.4222
DtoEQ        0.014040 0.0205301  0.683870  0.4942
CR           0.299251 0.0586387  5.103309  0.0000
ROA         21.095420 1.3049369 16.165854  0.0000
G           -0.011921 0.0214111 -0.556774  0.5778

 Correlation:
      (Intr) E      S      BVA    DtoEQ  CR     ROA
E     -0.199
S     -0.436 -0.731
BVA   -0.098 -0.157  0.051
DtoEQ -0.058  0.062 -0.086  0.114
CR    -0.532  0.070  0.166  0.177  0.176
ROA   -0.198  0.123 -0.126 -0.050 -0.181 -0.263
G      0.025  0.015 -0.019 -0.070 -0.005 -0.059 -0.011

Standardized residuals:
        Min          Q1         Med          Q3         Max
-2.61903220 -0.32521588 -0.05412642  0.22873354 17.17511674

Residual standard error: 2.286147
Degrees of freedom: 840 total; 832
residual
```

Robustness variable model GLS Q

```
Generalized least squares fit by REML
  Model: Q ~ E + S + MktCap + DtoEQ + CR + ROA + G
  Data: mydata
       AIC      BIC    logLik
  3786.608 3829.123 -1884.304

Coefficients:
                Value Std.Error   t-value p-value
(Intercept) -1.053451 0.3520048 -2.992719  0.0028
```

```
E            0.011289 0.0056966  1.981635  0.0478
S            0.000267 0.0061964  0.043137  0.9656
MktCap       0.000000 0.0000000  9.539334  0.0000
DtoEQ        0.031822 0.0194450  1.636495  0.1021
CR           0.360616 0.0550987  6.544913  0.0000
ROA         16.785305 1.3158820 12.755935  0.0000
G           -0.023322 0.0203140 -1.148092  0.2513

 Correlation:
       (Intr) E      S      MktCap DtoEQ  CR     ROA
E      -0.223
S      -0.432 -0.731
MktCap  0.072 -0.084  0.008
DtoEQ  -0.041  0.073 -0.091  0.086
CR     -0.514  0.091  0.160  0.101  0.167
ROA    -0.216  0.137 -0.119 -0.339 -0.195 -0.276
G       0.014  0.008 -0.016 -0.053 -0.001 -0.052  0.004

Standardized residuals:
        Min          Q1         Med          Q3         Max
-3.31289709 -0.31188795 -0.02905225  0.22758635 16.13418950

Residual standard error: 2.171368
Degrees of freedom: 840 total; 832
residual
```

Model only for E

```
Generalized least squares fit by REML
  Model: Q ~ E + BVA + DtoEQ + CR + ROA + G
  Data: mydata
       AIC      BIC    logLik
  3859.753 3897.553 -1921.876

Coefficients:
                Value Std.Error   t-value p-value
(Intercept) -1.279178 0.3340251 -3.829586  0.0001
E            0.016269 0.0041264  3.942644  0.0001
BVA          0.000000 0.0000000 -0.800802  0.4235
DtoEQ        0.013910 0.0204419  0.680451  0.4964
CR           0.299971 0.0577877  5.190911  0.0000
ROA         21.083327 1.2938287 16.295300  0.0000
G           -0.011952 0.0213944 -0.558635  0.5766

 Correlation:
```

```
      (Intr) E      BVA    DtoEQ  CR     ROA
E     -0.844
BVA   -0.085 -0.176
DtoEQ -0.106 -0.002  0.118
CR    -0.518  0.285  0.171  0.194
ROA   -0.283  0.045 -0.044 -0.194 -0.247
G      0.018  0.001 -0.069 -0.007 -0.056 -0.014

Standardized residuals:
        Min          Q1         Med          Q3         Max
-2.62085851 -0.32436389 -0.05406897  0.22950111 17.18308725

Residual standard error: 2.284782
Degrees of freedom: 840 total; 833
residual
```

Model Only for Q

```
Generalized least squares fit by REML
  Model: Q ~ S + BVA + DtoEQ + CR + ROA + G
  Data: mydata
      AIC     BIC    logLik
  3867.09 3904.89 -1925.545

Coefficients:
                Value Std.Error   t-value p-value
(Intercept) -1.064281 0.3654190 -2.912496  0.0037
S            0.012614 0.0044741  2.819340  0.0049
BVA          0.000000 0.0000000 -0.376179  0.7069
DtoEQ        0.010568 0.0205711  0.513724  0.6076
CR           0.287991 0.0587233  4.904209  0.0000
ROA         20.657014 1.3001664 15.887977  0.0000
G           -0.012805 0.0214923 -0.595782  0.5515

 Correlation:
      (Intr) S      BVA    DtoEQ  CR     ROA
S     -0.870
BVA   -0.134 -0.095
DtoEQ -0.047 -0.060  0.125
CR    -0.530  0.320  0.191  0.173
ROA   -0.178 -0.053 -0.031 -0.190 -0.274
G      0.028 -0.012 -0.069 -0.006 -0.060 -0.013

Standardized residuals:
        Min          Q1         Med          Q3         Max
```

```
-2.62312611 -0.32747686 -0.03731024  0.22539484 17.11290549


Residual standard error: 2.295077
Degrees of freedom: 840 total; 833
residual
```