

*ESG Investing in Uncertainty: Analyzing the Returns of ESG Within Various States  
of Investor Sentiment*

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## **Abstract**

This paper examines the relationship between corporate responsibility and stock performance through various levels of fear in the market. I utilize Environmental, Social, and Governance scores (provided by Thomson Reuters Eikon) for measures of corporate responsibility, and the Volatility Index, or VIX (created by the Chicago Board Options Exchange), to quantify levels of fear. Stock performance is measured weekly, with companies from the S&P 500 as my representative sample. Results focus on ESG Total scores and the individual pillar breakdowns for each ESG component. My findings demonstrate that in the presence of considerably higher levels of fear, increases in ESG scores yield positive returns. On the other hand, lower levels of fear resulted in negative returns. My results suggest that there is an association between ESG and stock returns, with the direction being dependent on the level of investor fear in the market.

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### **Acknowledgements**

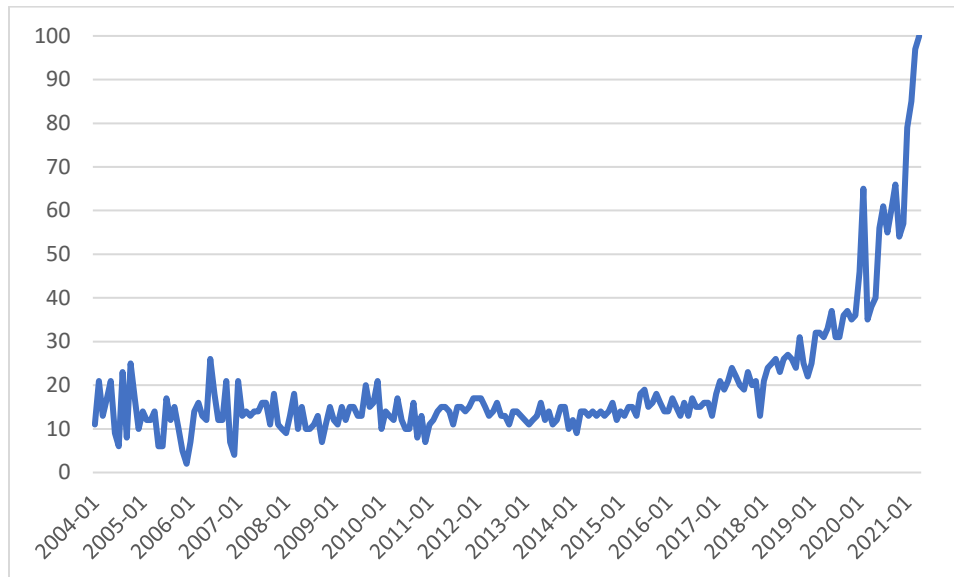
First and foremost, I would like to thank my mother, Joyce, for being my rock through good and bad times. I would also like to thank Professor Carola Binder for her guidance throughout this process. Special thanks also go to John Donaldson of the Haverford Trust Company for introducing me to the world of ESG investing. Additionally, I would like to thank my friends, teammates, and coaches for being positive contributors to my Haverford College experience. Last but certainly not least, I would like to thank God for giving me the strength to go forward in all my endeavors.

## **I. Introduction**

In a world in which information has been increasingly accessible to all, it is of no surprise that corporate practices have also seen heightened attention. The increased transparency regarding business ethics, coupled with nonstop news availability, has surely played a role in the rising awareness of social and environmental issues. Millennials have made their stance on social and political topics well known. In the past year, issues regarding race and inequality have been on the forefront of news media, with company and institutional initiatives meant to boost diversity and equity also having been brought forward. The acceptance of climate change in a digitized world has also led to increased recognition of carbon footprints, with corporate promises to reduce emissions following suit. For reference, after the infamous Deepwater Horizon oil spill, the stock price of the British Petroleum Company tumbled by 51%, which resulted in a tremendous blow to the firm's market value. Some c-suite executives have responded accordingly, sometimes deeming improved ethics as “good for business”. Considering that Gen Z is even more diverse and more progressive on social issues than millennials (Pew Research Center), we can expect trends and attitudes regarding corporate behavior to continue.

As expected, the world of finance has taken note of such trends. To quantify levels of corporate responsibility, ratings groups have created metrics to assess environmental, social, and governance (ESG) practices. ESG investing has been rapidly increasing in popularity—Figure 1 illustrates Google Trends searches of the term “ESG” dating back to 2004, in which it is evident that search volume has increased by nearly 500% in the past three years.

**Figure 1: ESG Searches (Google Trends)**



**Notes:** The above graph depicts Google Trends search results of the phrase “ESG” dating back to January 2004.

Having witnessed the COVID-19 Pandemic-induced Recession and the Great Recession of 2008, I saw an opportunity to analyze the performance of companies through volatile times in the context of ESG. Do investors scrap all ESG considerations when fear hits the market? Or do they rather use ESG as a method of screening for safer companies to weather the storm? With my findings, I hope to gain insight on investor behavior during uncertainty, searching for a potential relationship with ESG on stock returns. My thesis aims to build on the existing literature regarding corporate responsibility ratings and stock performance, while further contributing key findings on ESG performance when interacted with uncertainty, grouped as “calm” vs. “fearful” times.

## **II. Literature Review**

The literature pertaining to ESG investing and its financial implications is mixed—empirical results vary across geographies, industries, portfolio selection strategies, and investment methods. One strand of literature demonstrates that higher social responsibility ratings are positively associated with financial performance as two potential explanations have

been laid forward—the “available fund hypothesis” and the “good management” hypothesis (Auer and Schuhmacher 2016).

The available fund hypothesis suggests that better performing companies can afford to consider ESG criteria in their decision making. Eichholtz, Kok, and Yonder (2012) demonstrate a positive relationship between operating performance and socially responsible activities within REITs, reinforcing the notion of “slack resources” allowing firms to be better equipped to partake in such activities. The authors utilized the Fama and French (1993) model, controlling for size, value, and market risk. Findings suggest that socially responsible activities have a positive effect on key operating performance measures such as return on assets and return on equity, among others, supporting the available fund hypothesis.

On the other hand, Auer and Schuhmacher’s (2016) good management hypothesis suggests that by tending to aspects like “job security” or “product enhancement”, firms indirectly behave responsibly while continuing business and retaining employees through loyalty. McGuire, Sundren, and Schneeweis (1988) point to such theoretical frameworks, suggesting that a carry-over effect in subsequent time periods may exist from responsible firm behavior as a result of “employee morale” and boosted productivity. Further along the strand of management directed effects, Alexander and Buchholz (1978) point out that firms with management that naturally care about socially responsible behavior may be innately at an advantage when it comes to better operations within a company, thus worthy of consideration by investors.

Kempf and Osthoff (2007) provide empirical evidence of fund managers being rewarded for socially responsible investing via various portfolio selection strategies, with a “best-in-class” approach (selection of companies with the highest ratings, balanced across industries) resulting in abnormal returns of 8.7%. Their method was to “go long” in the highest rated companies, and

to short the lowest rated (Kempf and Osthoff 2007). Furthermore, literature also suggests it being worthwhile to break down ESG ratings into subcategories, as defined by each pillar, to analyze aspects of composite ratings on performance (see Latorre, Mango, Cafaro, et. al 2020 and Auer and Schuhmacher 2016). With various methods of measuring corporate responsibility (such as individual pillar scores), authors show that results may vary based on the criteria used for ESG.

Conversely, there exists a strand of literature that does not support the claims of improved financial performance as a result of socially responsible considerations. Auer and Schuhmacher (2016) also put forward two possible explanations: the “managerial opportunism hypothesis” and the “trade-off theory”. The first hypothesis argues that in weak times, managers compensate for decreased performance with socially responsible activities for the sake of shareholder utility (Posner and Schmidt 1992). The second hypothesis suggests that tending to social responsibility as a firm hinders performance, as it detracts from sole focus on profit maximization (Auer and Schuhmacher 2016). In a similar vein, Buchholz (1978) proposes that higher rated firms are put in an unfavorable position because of the higher expenses needed to maintain higher performance

Barnea and Rubin (2010) provide empirical evidence to support aspects of the managerial effects hypothesis. The authors highlight that managers and members with inside ownership may over-invest in socially responsible activities for a “warm-glow” effect, which in turn could reduce firm value due to such over-investment. Empirically, Auer and Schuhmacher (2016) document that there is no significant relationship between higher ESG ratings and increased performance, nor is there a relation between lower ratings and decreased performance. However, in select industries, the authors find that investors pay a premium for social responsibility.

A final theory is that socially responsible ratings have no impact on performance. With the assumption that ESG ratings have no bearing on the riskiness of select companies, typical valuation methods do not incorporate firm social responsibility (Auer and Schuhmacher 2016). In other words, any association stemming from such ratings on performance would be attributed to external factors.

As stated in the introduction, my thesis builds on existing literature through analysis of a state-dependent association between ESG ratings and stock performance, inspired by the COVID-19 induced recession and Great Recession. Ameer, Gnegne, and Jawadi (2013) provide insight into alterations in investor behavior during heightened volatility, noting how risk premiums fluctuate with the business cycle and rise to peaks during recessions, with a specific focus range of 1989 to 2011. Naturally, higher risk premiums signify lower risk appetites, and under a hypothesis of ESG reducing firm risk, the prospect of ESG being utilized during turbulent periods as a return to safety should be explored (see Sassen, Hinze, and Hardeck 2016). This serves as a key motivation for my empirical study.

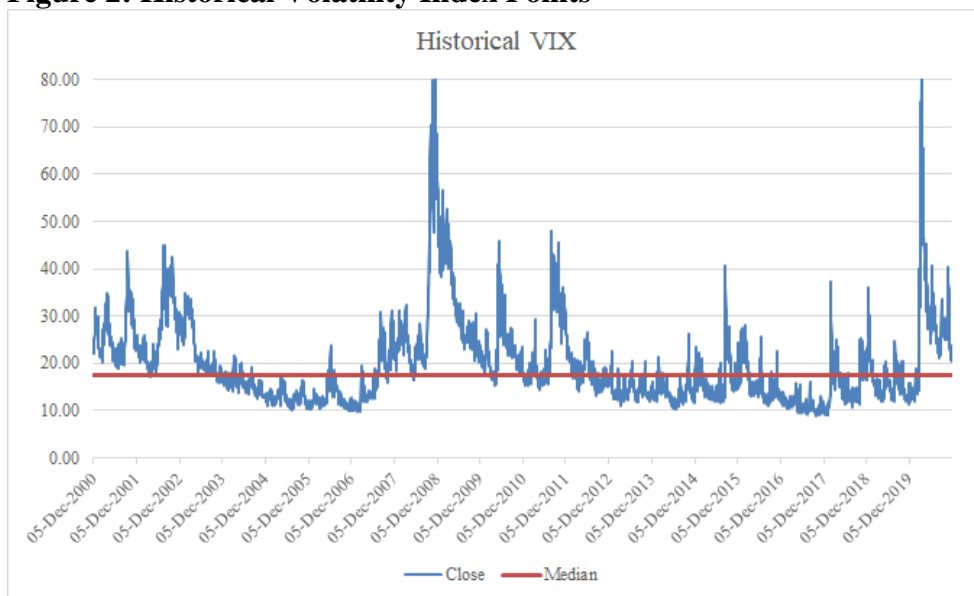
As in some of the prior empirical literature, I will analyze performance at the company level rather than comparing performances of Socially Responsible Investing funds to broader benchmark indexes. My sample includes all stocks in the S&P 500, all of which possess ESG ratings. My paper provides more recent empirical findings within the extensive literature on ESG investing and financial performance. I also hope to expand on previous research through thoughtful analysis of each component of ESG composite scores. To my knowledge, there are no works that focus on ESG through the lens of “good” and “uncertain” times, as defined by the VIX, while searching for potential differences within higher rated environmental, social, and governance metrics and company performance.



### III. Data and Methodology

My thesis will utilize information provided by Thomson Reuters Eikon, pulling key data points from the S&P 500 and the Eikon ESG ratings system from 2011 to 2020. I use an unbalanced panel dataset that provides information for 495 firms on a weekly basis, thus 268,810 observations. I use the VIX as a proxy for “fearful” times as opposed to “normal” times. Created by the Chicago Board Options Exchange, this index serves as a volatility measure of S&P 500 companies derived from the market index’s options prices. The median daily closing value of the VIX from December 1st, 1990 to December 1st, 2020 is 17.44. A graph of the VIX is seen below in Figure 2.

**Figure 2: Historical Volatility Index Points**



**Notes:** The above graph depicts the VIX index daily close price from 12/2000 to 12/2020. The red line is the median historical value.

**Table 1: Summary Statistics**

<b>Component</b>	<b>Mean</b>	<b>Standard Deviation</b>	<b>Max</b>
Environmental Pillar	46.46	28.83	98.53
Social Pillar	56.91	20.57	97.88
Governance Pillar	57.62	20.99	98.72
ESG Controversies	81.67	30.51	100
ESG Total	17.76	17.64	92.6

**Notes:** The above table shows summary statistics (mean, standard deviation, and maximum values) for each ESG breakdown

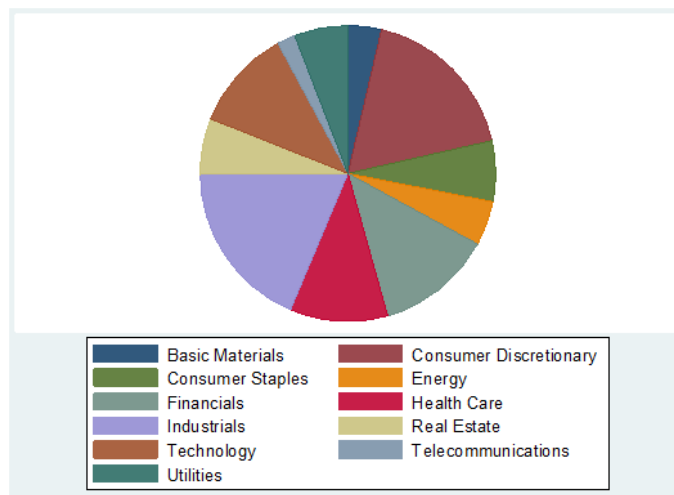
Eikon utilizes Refinitiv, a global database for financial markets, to calculate the various ESG ratings. The scores are on a scale of 1-100, with data available for over 10,000 companies reported on an annual basis, dating back to 2002. Each firm receives an ESG score and an ESG combined score, with additional score breakdowns for each component, known as pillars. Data is gathered from numerous sources that include company filings, company websites, stock filings, and auditors. The environmental pillar focuses on resource usage, emissions, and innovation, whereas the social pillar incorporates workforce practices, human rights, community initiatives, and product responsibility. Finally, the governance pillar includes management, shareholder, and corporate responsibility. These three pillars create the preliminary ESG score for each firm.

Refinitiv also uses a metric to measure ESG controversies, which is calculated from 23 potential controversy topics. The preliminary ESG score then discounts the ESG controversies score to result in the final ESG Combined score. With this, my independent variables are as follows: environmental pillar score, social pillar score, governance pillar score, ESG controversies score, and ESG combined score.

My thesis will utilize an Ordinary Least Squares (OLS) regression with time-fixed effects. As in Fama and French (2015), my dependent variable for measuring individual firm

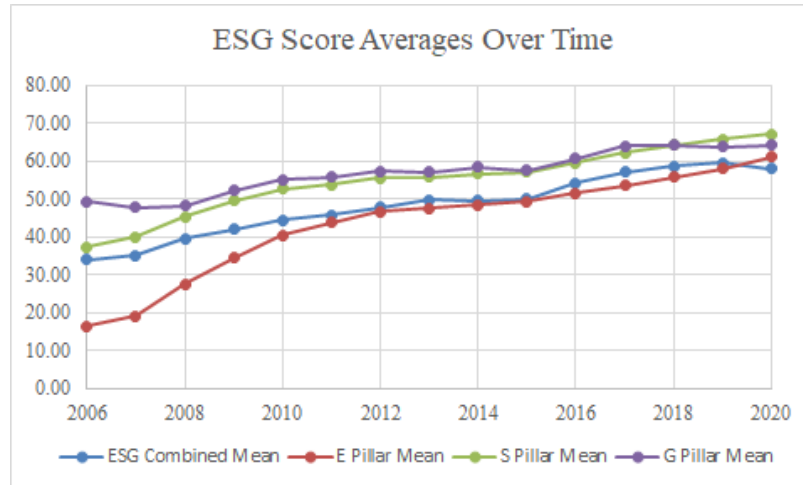
performance will be a stock's weekly returns, which is calculated by the weekly percentage change in stock price as of market close. Following Fama and French (2015), I control for size and profitability with market capitalization and return on equity, respectively, while also adding the VIX and industry sector as controls. Market capitalization, also known as equity value, is equal to the product of stock's share price and its outstanding shares. This informs an investor about the total monetary value of a company in equity terms. Auer and Schuhmacher (2016) highlight how this size can influence performance, given that low market capitalization stocks have shown to outperform high market capitalization stocks. Regarding profitability, return on equity is the firm's net income divided by the firm's equity value. Industries are defined according to the Global Industry Classification Standard's eleven sector breakdowns, as seen below in Figure 3.

**Figure 3: S&P 500 Sector Breakdown**



**Notes:** This pie chart illustrates the sector breakdown of the S&P 500, as laid forward by the Global Industry Classification Standard.

**Figure 4: Mean Score by Year**



**Notes:** This line graph illustrates the yearly average of the ESG Combined score and its pillar scores across all firms in the dataset.

As seen in Figure 4 above, there is a clear upward trend in ESG ratings over time. The graph illustrates the pillar breakdowns, showing that the environmental pillar has been lower on average than both the social pillar and governance pillar, but the gap is shrinking considerably. As environmental concerns have become increasingly flagged due to climate change, this is not surprising. The increasing scores across all components demonstrate increased actions toward ESG activities over time, which also is expected given its increasing popularity in investing. Table 2 shows the degree of correlation of the ESG total score and its pillar scores. The pillar scores are correlated with the ESG total score, especially present within the environmental and social pillars.

**Table 2: Correlation Matrix**

	ESGTot	escore	sscore	gscore
ESGTot	1.0000			
escore	0.7209	1.0000		
sscore	0.7443	0.7339	1.0000	
gscore	0.6229	0.3906	0.3476	1.0000

In order to account for the time effects shown in Figure 4, I will utilize a time fixed effects regression, seen in regressions 1-5. I will incorporate regressions for each ESG pillar

component, inspired by Auer and Schuhmacher (2016), which demonstrated that individual rating components yield varying results. Regarding the main independent variables, regression (1)-(3) will use the individual pillar score components to allow to focus on E, S, and G scores independently. Regression (4) uses the combined ESG total score, which includes a discount for ESG controversies. Regression (5) then uses the ESG Controversies as the main independent variable.

$$(1) \text{ Return}_{it} = B_0 + B_1 \text{EScore}_{it} + B_2 \text{EScore}_{it} * \text{Vix}_t + B_3 \text{Vix}_t + B_4 \text{MktCap}_{it} + B_5 \text{ROE}_{it} + B_6 \text{Sector1}_i + B_7 \text{Sector2}_i + \dots u_{it}$$

$$(2) \text{ Return}_{it} = B_0 + B_1 \text{SScore}_{it} + B_2 \text{EScore}_{it} * \text{Vix}_t + B_3 \text{Vix}_t + B_4 \text{MktCap}_{it} + B_5 \text{ROE}_{it} + B_6 \text{Sector1}_i + B_7 \text{Sector2}_i + \dots u_{it}$$

$$(3) \text{ Return}_{it} = B_0 + B_1 \text{GScore}_{it} + B_2 \text{EScore}_{it} * \text{Vix}_t + B_3 \text{Vix}_t + B_4 \text{MktCap}_{it} + B_5 \text{ROE}_{it} + B_6 \text{Sector1}_i + B_7 \text{Sector2}_i + \dots u_{it}$$

$$(4) \text{ Return}_{it} = B_0 + B_1 \text{ESGTot}_{it} + B_2 \text{EScore}_{it} * \text{Vix}_t + B_3 \text{Vix}_t + B_4 \text{MktCap}_{it} + B_5 \text{ROE}_{it} + B_6 \text{Sector1}_i + B_7 \text{Sector2}_i + \dots u_{it}$$

$$(5) \text{ Return}_{it} = B_0 + B_1 \text{ESGContro}_{it} + B_2 \text{EScore}_{it} * \text{Vix}_t + B_3 \text{Vix}_t + B_4 \text{MktCap}_{it} + B_5 \text{ROE}_{it} + B_6 \text{Sector1}_i + B_7 \text{Sector2}_i + \dots u_{it}$$

For regressions 1 through 4, I hypothesize that the  $B_1$  coefficient will have a positive sign, demonstrating a positive relationship between ESG scores and returns of a particular stock. With this, I then hypothesize a negative sign for ESG Controversies scores in regression (5) given that higher amounts of negative media attention and scandals may adversely impact share price due to increased non-operating expenses such as lawsuits, increased taxes for negative externalities, or any additional expenses incurred as a result of such attention.

Furthermore, given the recent findings of Sassen, Hinze, and Hardeck (2016) that higher corporate social performance (CSP) levels point to lower levels of risk, I hypothesize that during fearful times, investors will flock to “safe-haven” securities. This leads to greater returns of companies with higher ESG scores relative to those with lower ratings. This implies positive  $B_2$  signs for all regressions except for regression (5), for which I expect the opposite to occur. With regressions 1-3, I hypothesize that the pillar scores will also have positive effects in  $B_1$ , but not as strong as the composite ESG effect on returns, given their lack of a controversies overlay. I also expect for the Energy and Consumer Discretionary sectors to have more amplified effects. This is attributed to a potential environmental focus within the Energy industry, and the presence of consumer decision-making in the Consumer Discretionary sector, potentially impacting performance.

## IV. Results

Dependent Variable: Weekly Stock Returns	(1)	(2)	(3)	(4)	(5)
Environmental Pillar Score	-0.00506** (-3.20)				
E-Pillar*VIX	0.000185* (-1.98)				
Social Pillar Score		-0.00645** (-3.02)			
S-Pillar*VIX		0.000268* (-2.14)			
Governance Pillar Score			-0.00551** (-2.69)		
G-Pillar*VIX			0.000215 (-1.84)		
ESG Total Score				-0.00865** (-3.26)	
ESGTotal*VIX				0.000380* (-2.44)	
ESG Controversies Score					0.000307 (-0.23)
ESGControversies*VIX					0.0000307 (-0.39)
VIX	0.459 (-0.33)	0.456 (-0.32)	0.449 (-0.32)	-0.0739 (-1.16)	-0.0588 (-0.94)
Market Cap	0.000000616*** (-5.45)	0.000000561*** (-4.77)	0.000000469*** (-4.08)	0.000000370*** (-3.41)	0.000000589*** (-5.21)
Return on Equity	-0.0000913** (-3.26)	-0.0000914*** (-3.36)	-0.0000888** (-3.13)	-0.000041 (-1.14)	-0.0000434 (-1.24)
Basic Materials	0 (.)	0 (.)	0 (.)	0 (.)	0 (.)
Consumer Discretionary	-0.0295 (-0.62)	-0.0386 (-0.82)	-0.0414 (-0.89)	-0.0307 (-0.66)	-0.0455 (-0.91)
Consumer Staples	0.0423 (-0.86)	0.0277 (-0.56)	0.025 (-0.51)	0.0309 (-0.63)	0.0202 (-0.37)
Energy	0.00746 (-0.14)	-0.00881 (-0.17)	-0.021 (-0.39)	-0.00282 (-0.05)	-0.0213 (-0.37)
Financials	-0.0448 (-0.95)	-0.0536 (-1.13)	-0.0651 (-1.40)	-0.0568 (-1.22)	-0.0541 (-1.08)
Health Care	0.00953 (-0.2)	0.0166 (-0.35)	0.0103 (-0.22)	0.0221 (-0.48)	-0.00119 (-0.02)
Industrials	-0.0498 (-1.05)	-0.0613 (-1.30)	-0.0582 (-1.26)	-0.0582 (-1.24)	-0.064 (-1.28)
Real Estate	-0.0499 (-0.93)	-0.0466 (-0.85)	-0.0504 (-0.95)	-0.045 (-0.84)	-0.0472 (-0.82)
Technology	-0.062 (-1.28)	-0.0686 (-1.43)	-0.0809 (-1.70)	-0.0631 (-1.33)	-0.0722 (-1.41)
Telecommunications	0.0631 (-1.02)	0.0551 (-0.9)	0.0485 (-0.87)	0.0555 (-0.94)	0.0441 (-0.75)
Utilities	-0.0519 (-1.02)	-0.0659 (-1.29)	-0.0749 (-1.50)	-0.0548 (-1.10)	-0.0684 (-1.30)
_cons	-10.53 (-0.36)	-10.48 (-0.36)	-10.31 (-0.36)	0.485 (-0.37)	0.0965 (-0.07)
N	206,708	206,708	206,708	203,890	191,238
t statistics in parentheses					
** p<0.05		** p<0.01			*** p<0.001"

**Notes:** The dependent variable is weekly stock returns. My regression uses an unbalanced data set of 495 firms from 2011 to 2020. Parentheses show standard error values.

In my analysis, I define investor sentiments at various levels of the VIX, with each representing a specified percentile. The four states I utilize are shown below in Table 4.

**Table 4: VIX Percentile Values**

<b>Investor Sentiment</b>	<b>VIX Percentile</b>	<b>VIX Value</b>
Confident	5 <sup>th</sup>	11.29
Somewhat Calm	25 <sup>th</sup>	13.63
Somewhat Fearful	75 <sup>th</sup>	22.92
Panic	95 <sup>th</sup>	33.71

**Notes:** The above table shows investor sentiment states with corresponding percentiles and values for the VIX.

Table 3 shows the results for my five regression models, in which we see negative coefficients for all three pillar scores, as well as the overall ESG total score at the 1% level. This demonstrates that when VIX has a value of zero, there is a negative association between weekly returns and higher ESG scores. In this circumstance, we see support for Barnea and Rubin (2010) and their idea of a trade-off that may occur with investment in ESG and the “warm-glow effect”, earlier mentioned in Section II. Also, when VIX is set to zero, we see that market capitalization has a positive relationship with weekly returns. These results contrast Auer and Schuhmacher (2016) and their findings of low market capitalization stocks outperforming high market capitalization stocks. Regarding the ESG controversies pillar score, results showed no statistically significant relation. There also was no statistically significant relation across any of the sectors.

For the environmental pillar score, the interaction coefficient of 0.000185 is significant at the 5% level. When the VIX is at its 5th percentile value, coefficients imply that a 10-point increase in the environmental score would result in a *decrease* in weekly returns by .0297%. At



the VIX's 25th percentile, defined as "somewhat calm" times, a 10-point increase in environmental scores is associated with a decrease in returns of 0.025%. This potentially demonstrates the idea of a tradeoff between environmental responsibility and stock returns in conditions of low fear in the market. This also could point to investors disregarding environmental responsibility during periods in which they have confidence in the overall market. During "somewhat fearful" times, in which VIX is at its 75<sup>th</sup> percentile, a 10-point increase in the environmental pillar score resulted in a weekly loss of .0081%, a considerably smaller decrease when compared to lower interacted VIX values. At the 95th percentile (defined as "panic") we see a reversed relationship, in which the environmental score demonstrated a positive correlation with weekly returns. Here, a 10-point increase in this pillar score yielded a 0.0018% weekly return. For reference, during times of extreme fear, such as the height of the 2007-2009 Financial Crisis or the onset of the COVID-19 Pandemic in the United States, the VIX reached levels as high as 80.86 and 82.69, respectively. At these values, 10-point increases in environmental scores would result in gains of 0.099% and 0.102% on a weekly basis.

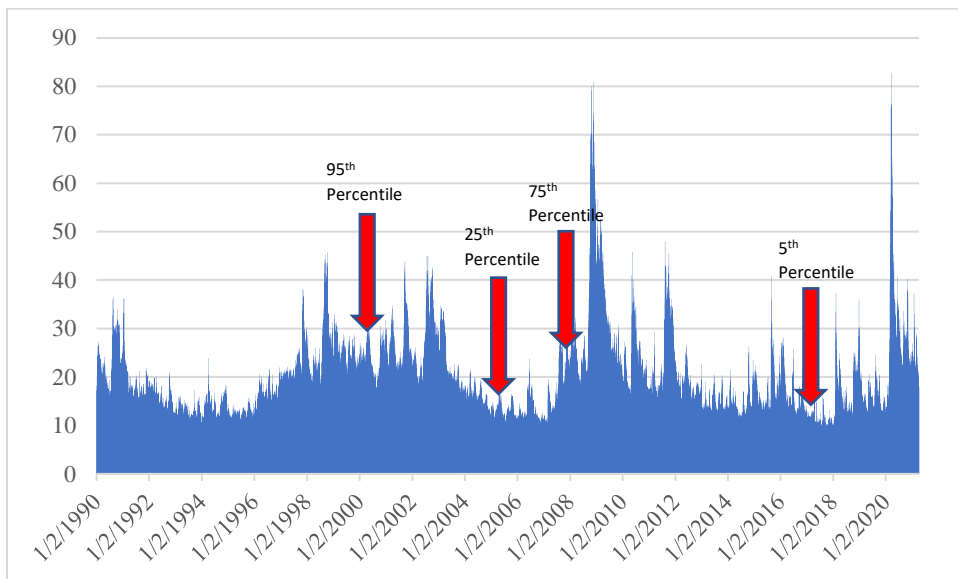
In other words, higher environmental scores yield positive returns above a VIX of 27.35, or the 87.1<sup>st</sup> percentile. Through the lens of previous literature, this points to Posner and Schmidt (1992) and their hypothesis of managers using corporate responsibility for the sake of shareholder utility during weak times. My results show that investors may choose environmentally safer companies in order to gain some sense of satisfaction with their investment decisions, but in good times, investors may give less importance to ESG in their investing decisions.

Similarly, when the VIX is above 24.07, higher social pillar scores are associated with higher returns, whereas when the VIX is below 24.07, higher scores are associated with lower returns. Interestingly, the social pillar score had a lower VIX inflection point than the environmental pillar score, demonstrating that investors see positive returns at less extreme VIX values for increased social scores as opposed to increased environmental ones. Results for the governance pillar did not yield statistically significant findings.

As shown in column (4) of Table 3, the coefficient on the interaction of ESG Total score with the VIX is larger than the analogous coefficients in columns (1) and (2), and is statistically significant. In the presence of confidence in the market, my results show that a 10-point increase in the ESG Total score resulted in a decrease in returns by 0.044% weekly. In somewhat calm times, a 10-point increase results in a weekly decrease of 0.035%. During somewhat fearful times, we see that there are slightly positive returns, as a 10-point increase in ESG Total scores yield a 0.001% gain. Furthermore, during times of panic, we observe a 0.042% weekly return as ESG scores increase by 10. The VIX inflection point for ESG total scores was at 22.8, or at the 74.3rd percentile of the VIX. With these results, we see that investors receive positive returns at less extreme values of the VIX in comparison to the environmental and social pillar scores.

Essentially, across the environmental pillar score, the social pillar score, and the overall ESG Total score, we see a negative relationship with increased scores in times of confidence in the market. On the other hand, as investors grow more fearful, we see a reversal in the relationship between returns—increases in ESG scores at a certain VIX threshold result in an increase in the weekly returns of a stock. Interestingly, there was no significant effect with the governance pillar. The regression also did not have significant effects on returns across any of the sectors.

**Figure 5: Historical VIX Percentiles**



**Notes:** The above graph illustrates the VIX index daily close price from 12/1990 to 12/2020, with arrows highlighting the various historical percentiles utilized to mark investor sentiment.

My results support the idea of improved financial performance due to corporate responsibility, while building on prior literature by incorporating the state of investors' fear in the market. Simultaneously, my results also support the other stand of literature that contends that there is a negative relationship with ESG scores and returns, but only in the presence of lessened fears in the market. With this, I contend that during times of fear, investors tend to move towards corporate responsibility, whether it be for their own satisfaction, or because they may consider higher rated firms as "safer" investments in terms of risk. I also contend that during times of confidence, investors are less attentive to ESG scores in their investment decisions.

**Table 5: State Dependent Returns**

<b>Investor Sentiment</b>	<b>VIX Percentile</b>	<b>Environmental Pillar Return</b>	<b>Social Pillar Return</b>	<b>ESG Total Score Return</b>
Confident	5 <sup>th</sup>	-0.0297%	-0.034%	-0.044%
Somewhat Calm	25 <sup>th</sup>	-0.025%	-0.028%	-0.035%
Somewhat Fearful	75 <sup>th</sup>	-0.008%	-0.003%	0.001%
Panic	95 <sup>th</sup>	0.002%	0.026%	0.042%

**Notes:** The above table shows VIX percentiles and returns for ESG components that yielded significant results.

## **V. Conclusion**

As the ESG investing approach continues to rise in popularity, fund managers will need to answer to clients about its performance in various investing conditions. This thesis hopefully provides some insight in a relatively recent area of study, considering that ESG is a new development in the world of finance. While the previous literature regarding ESG and overall performance is murky, I hope to be amongst the first contributors to give key findings in the context of performance in good vs. uncertain times. My results show a significant effect of ESG interacted with the VIX, pointing to a varied approach of investing towards ESG—an approach dependent on levels of fear in the market. My findings show a negative relationship between performance and ESG ratings with lesser amounts of fear in the market, which contributes to existing literature that discredits ESG as performance-driven investing. With this, there may exist a trade-off between corporate responsibility and stock performance. My findings also demonstrate a positive relationship between performance and ESG ratings during periods with higher amounts of fear, which supports the idea of ESG being “smarter” investments.

My work is not absent of limitations, however. Refinitiv is one of many ESG data providers, in which scoring methodologies vary across agencies. Other research with different providers is

necessary to prove if results are consistent across ratings providers. Furthermore, as ESG becomes more commonplace in the investing world, perhaps providers will begin to update across all firms on a monthly or even quarterly basis, which would provide more frequency for my dataset, as it utilized a more static approach to each company and their ESG scores. It must also be noted that my work only focuses on S&P 500 companies, limiting the scope of analysis to only the United States. Perhaps incorporating differences in geography can help observe any potential sentiment differences that may be present in various parts of the world. Continued research on ESG and performance will be also necessary, as my dataset only focuses from 2011 to 2020. As increased awareness and attention to ESG persists, it may be interesting to see if investor behavior towards the matter changes, especially as Gen Z and millennials enter the workforce.

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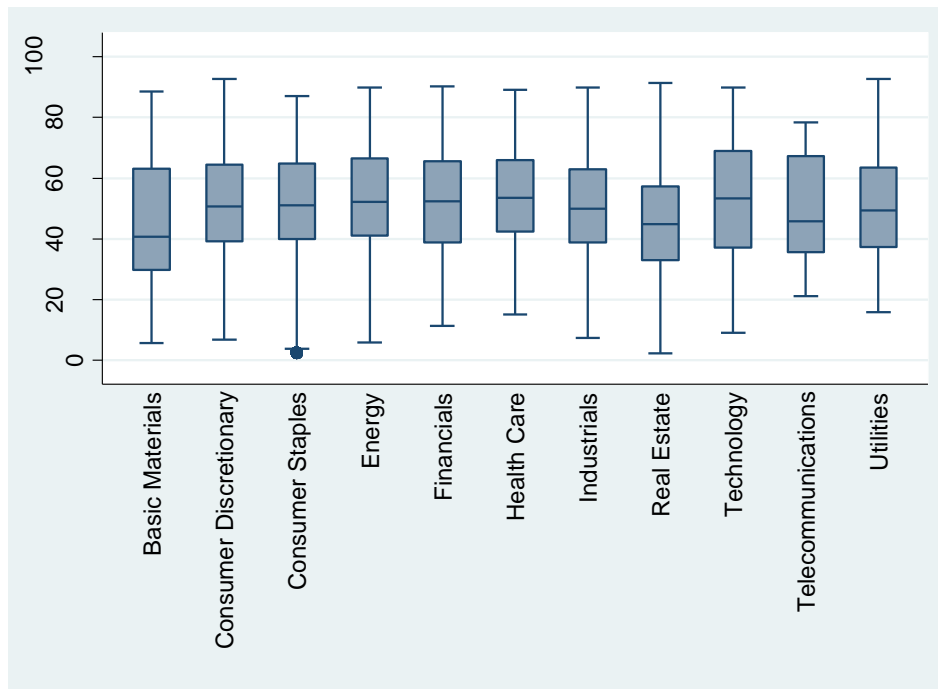
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## Appendix

**Figure 5: Correlation Matrix with ESG Components and Returns**

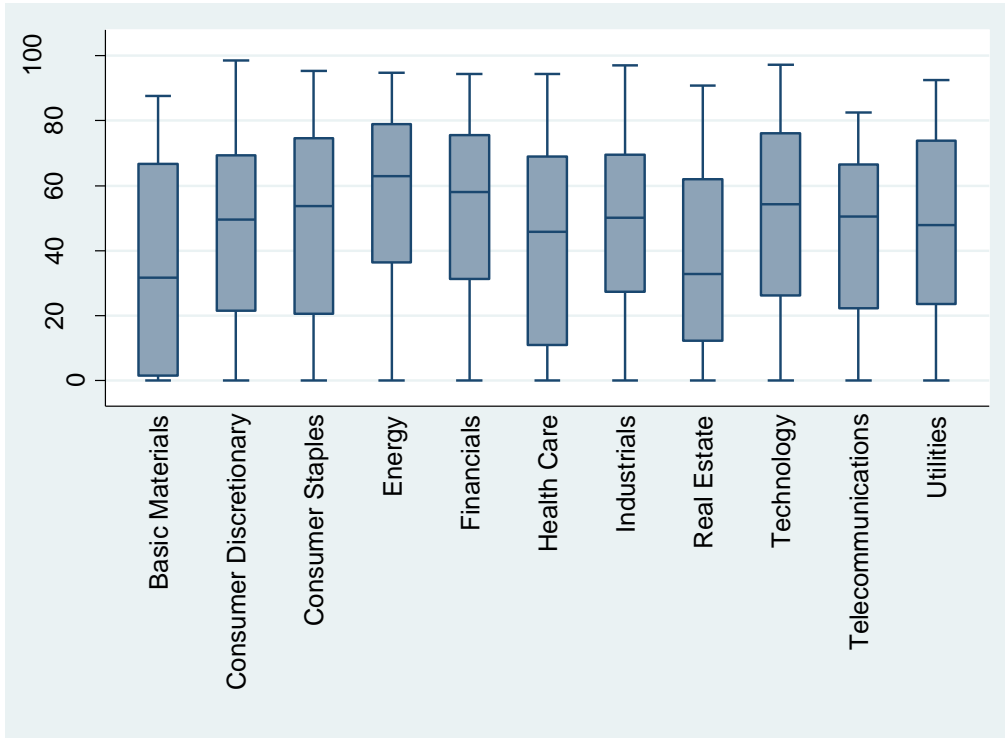
	ESGTot	escore	sscore	gscore	ESGCon~o	return
ESGTot	1.0000					
escore	0.7288	1.0000				
sscore	0.7439	0.7386	1.0000			
gscore	0.6158	0.3903	0.3401	1.0000		
ESGCon~o	0.2106	-0.2632	-0.2386	-0.0837	1.0000	
return	-0.0125	-0.0126	-0.0093	-0.0107	-0.0016	1.0000

**Figure 6: ESG Total Scores by Sector**

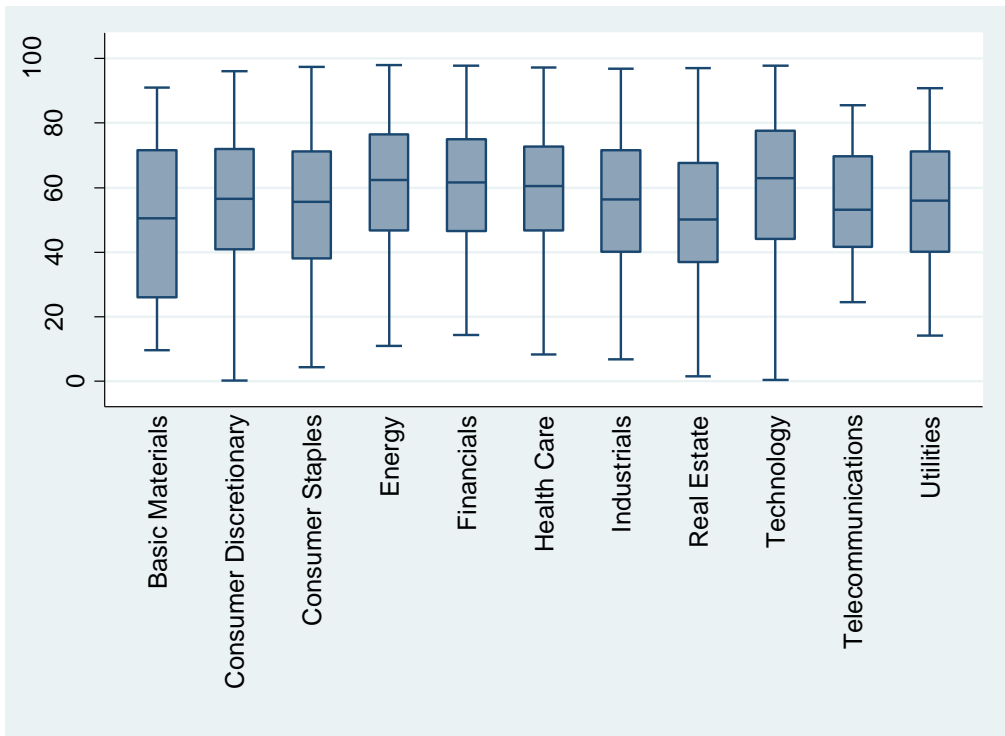




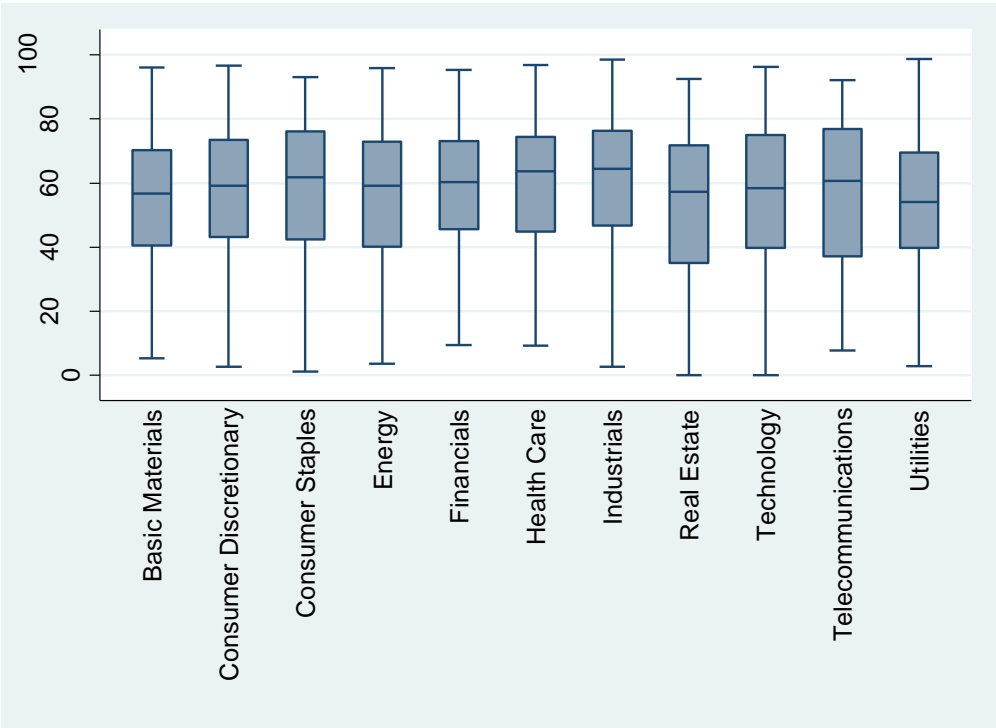
**Figure 7: Environmental Pillar Scores by Sector**



**Figure 8: Social Pillar Scores by Sector**



**Figure 9: Governance Pillar Score by Sector**



**Figure 10: Pillar Score Calculations from Thomson Reuters Eikon**

**Pillar scoring example**

In this section, an illustration of how [pillar scores are calculated](#) for the water and related utilities industry group, using the data available in the ESG database for FY2017.

Water and related utilities Illustration of calculation of pillar scores

Industry group	Emission	Innovation	Resource use	Environmental pillar scores	Human rights	Product responsibility	Workforce	Community	Social pillar scores	Management	Shareholders	CSR strategy	Governance pillar scores
Pillar weights	0.35	0.29	0.35		0.17	0.13	0.43	0.28		0.67	0.20	0.13	
ABC	0.66	0.00	0.44	0.39	0.05	0.58	0.89	0.34	0.56	0.99	0.84	0.56	0.90
CBD	0.71	0.96	0.38	0.67	0.00	0.69	0.66	0.70	0.57	0.37	0.01	0.56	0.32
DEF	0.03	0.00	0.00	0.01	0.00	0.00	0.57	0.11	0.27	0.21	0.14	0.54	0.24
EFG	0.00	0.31	0.03	0.10	0.00	0.00	0.25	0.59	0.27	0.89	0.94	0.00	0.78
EMJ	0.87	0.31	0.68	0.64	0.20	0.86	0.84	0.98	0.77	0.33	0.87	0.68	0.48
EMQ	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.02	0.13	0.88	0.08	0.01	0.60
ENR	0.92	0.81	0.85	0.86	0.75	0.97	0.93	0.66	0.83	0.40	0.49	0.86	0.48
GPO	0.24	0.31	0.00	0.17	0.00	0.17	0.02	0.16	0.08	0.56	0.56	0.00	0.49
HJI	0.61	0.31	0.50	0.48	0.65	0.42	0.80	0.80	0.72	0.48	0.27	0.37	0.43
IBD	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.30	0.11	0.51	0.49	0.00	0.43
JKL	0.50	0.73	0.74	0.65	0.00	0.78	0.43	0.93	0.54	0.62	0.89	0.26	0.63
LMN	0.76	0.31	0.56	0.56	0.00	0.47	0.48	0.48	0.40	0.17	0.24	0.26	0.20
MNO	0.82	0.31	0.91	0.70	0.40	0.58	0.61	0.07	0.42	0.33	0.52	0.63	0.41
MSE	0.55	0.00	0.62	0.41	0.85	0.17	0.75	0.84	0.72	0.77	0.35	0.91	0.71
OPQ	0.29	0.00	0.32	0.22	0.00	0.17	0.16	0.48	0.22	0.15	0.42	0.08	0.20
PQR	0.45	0.65	0.79	0.63	0.55	0.78	0.52	0.75	0.62	0.76	0.76	0.16	0.68
PSF	0.97	0.88	0.97	0.95	0.95	0.92	0.98	0.89	0.94	0.15	0.73	0.34	0.29
RST	0.08	0.31	0.00	0.12	0.00	0.17	0.20	0.59	0.27	0.42	0.42	0.00	0.36
UVW	0.34	0.00	0.26	0.21	0.20	0.58	0.70	0.39	0.52	0.26	0.16	0.31	0.25
VPF	0.16	0.31	0.15	0.20	0.00	0.17	0.11	0.25	0.14	0.88	0.90	0.00	0.77
XYZ	0.39	0.00	0.21	0.21	0.40	0.17	0.39	0.48	0.39	0.95	0.73	0.51	0.85
YQM	0.16	0.00	0.09	0.09	0.00	0.36	0.34	0.20	0.25	0.69	0.34	0.00	0.53

**Steps:**

- **Sum of category weights:** sum each category weight of respective pillars. The calculation to derive the sum of category weights is illustrated below:
  - Environmental pillar categories = resource use (0.08) + emissions (0.10) + innovation (0.16) = 0.34
  - Social pillar categories = workforce (0.10) + human rights (0.15) + community (0.08) + product responsibility (0.09) = 0.42
  - Corporate governance categories = management (0.16) + shareholders (0.05) + CSR strategy (0.03) = 0.24
- **New category weights:** new category weights are calculated based on the sum of the category weights calculated above. New category weights = category weights divided by the sum of the category weights of the respective pillar. The calculation of new category weights for environmental pillar is as below:
  - New category weight for resource use = 0.08 divided by 0.34 = 0.24
  - New category weight for emissions = 0.10 divided by 0.34 = 0.29
  - New category weight for innovation = 0.16 divided by 0.34 = 0.48  
(new category weights for social and corporate governance are similarly calculated)
- **Pillar score calculation:** category scores multiplied by new category weights = pillar scores. The calculation of the environmental pillar score is shown below:
  - (Resource use score\*0.24) + (emission score\*0.29) + (innovation score\*0.48) = 0.91 (environmental pillar score).  
(Social and corporate governance pillar scores are calculated similarly).

**Source:** Image taken directly from Thomson Reuters Eikon’s ESG Scoring Methodology Factsheet