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ESG Portfolios and Stock Returns:

An analysis of ESGs effect on financial performance

by

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Abstract

In recent years sustainable investment has increased enormously, and firms that are considered to have high social responsibility has gained interest from investors. However, if these firms have higher financial performance or not is still unclear, and researchers still have split opinions on the relationship. The purpose of this research is to analyze this relationship, with data collected from the S&P 500 with a period of 2002-2017. Using the ASSET 4 Environmental, Social, and Governance (ESG) score to conduct a panel data regression and a Fama-French Factor-Five study, with constructing different portfolios on the ESG score. Results indicate that a portfolio constructed on the low ESG score outperforms the portfolio with high ESG score, through both higher Sharpe ratio and the portfolio with high ESG has negative abnormal returns. Another interesting result is that the Financial Crisis of 2008-2009 disrupted the ESG portfolios, from changing their performance and the significance of ESG effect on stock performance.

Keywords: ESG, Fama-French Five-Factor model, HML Portfolio, S&P 500, Financial Crisis

Table of Contents

List of Figures and Tables

1. Introduction

The purpose of this research is to study the effects of implementing Environmental, Social, and Governances (ESG) policies on stock performance, focusing on the firms in the S&P 500. It is essential to understand this effect as investors today are using the ESG score as one of the factors to decide their investment. It is also crucial for firms to understand the implications of a high ESG score.

Since the early 1990s sustainable investment has increased enormously, by both private investors and financial institutions, therefore companies have followed this trend, with measuring and reporting of data that mirrors what is essential for sustainable investors. Implications of this had led to that 80% of the largest companies today reveal their ESG data to investors. Where today the sustainable, responsible, and impact investing is worth 12 trillion dollars in the US and even increased by 38% from 2016. US SIF (2019) reported that much of this has to do with that asset manager are using the ESG criteria for financial analysis of firms.

Kell (2019) points out that there has been an acceleration of ESG investing since 2013-2014, much due to the increasing research pointing towards a positive correlation between ESG and financial performance. Bansal et al. (2018) point out that ESG has become a criterion for analysts and investors to analyze the chance of a firm to survive in the long run. Reasoning on that higher ESG score is as a precaution against future legislation, lawsuits, or to gain positive views from the public.

However, it is not always the case; previous research has found mixed results regarding the effect of ESG on financial performance, from a positive effect to no-effect, and even negative effect. Researchers have tested the effect of Corporate Social Responsibility (CSR) using both returns, accounting-based performance, and even indicators such as consumer loyalty and interest from financial analysts. That CSR may have a direct or an indirect value-enhancing ability. What also has been found by researchers is that not every firm behaves similarly. The results have shown to be highly dependent on what type of data, country, method, period, and rating provider the researcher uses (further discussed in section 2), which makes ESG still an exciting topic for

research, if ESG scores promote stock returns and if firms with higher ESG score outperform those with lower ESG score.

The research uses the ESG data, provided by the ASSET4 (Thomson Reuters), for the firms in the S&P 500. The data covers the years from the start of 2002 to the end of 2017, creating an unbalanced panel data, analyzed with a fixed effect model. The data have also been used to create different portfolios based on their ESG scores and analyzed with the Fama-French Five-Factor model (FF5). A robustness test has also been implemented on the two methods, with the periods before and after the financial crisis of 2008-2009.

The results do not show any reliable evidence that ESG score can explain stock returns. However, we find some explanatory power for changes in the Governance score and the one-year lagged Environmental score. The portfolio strategy shows that the portfolio constructed on firms with low ESG score outperforms the portfolio constructed on firms with high ESG score, where the higher ESG portfolio exhibit negative abnormal returns and lower Sharpe ratio (SR). However, these results depend on the financial crisis of 2008-2009, when eliminating this period, it changes the results. It also shows that before the financial crisis, the results point towards a positive effect of ESG on financial performance, and a portfolio constructed on firms with high ESG scores outperforms the portfolio with low ESG scores. After the crisis, this changed to the opposite.

A number of the studies have conducted similar analyses using the Fama-French Three-Factor model (FF3) and/or the Carhart Four-Factor model (CFF), applying cross-sectional and/or time-series regressions. This research contributes to the literature by applying the recently suggested Fama-French Five-Factor model and the use of panel data regressions. This research also offers new insights about the financial crisis as a disruptor force for the effect of ESG on financial performance and that researchers need to consider and study the effect of ESG before, during, and after the financial crisis as separate cases.

The remainder of the research is structured as follows. Chapter 2 is a review of the previous literature. Chapter 3 describes the data and methodology used in this research. Chapter 4 reports

the estimates and discussed in Chapter 5. Chapter 6 involves the main conclusion and contributions to future research. Lastly, the appendix reports all the relevant tables used for the analysis.

2. Corporate Social Responsibility effects on financial performance

Friedman (1970) states that a firm's objective is to pursue shareholder value and to maximize financial performance for its shareholder and if not, would be suicidal. Which was supported by McWilliams and Siegel (1997); Jensen (2002); Tirole and Bénabou (2010) that social responsibility diverts from the track of maximizing financial performance, due to that higher CSR comes with a cost, making high CSR a disadvantage for firms. Other adverse problems with CSR is that some researcher state it is a waste of resources and that managers use CSR as a tool to maximize self-gained profits instead of benefiting the shareholders (Barnea and Rubin, 2010; Groening and Kanuri, 2013). However, previous researchers are supporting mixed connections of CSRs effect on financial performance from positive to negative. What researcher can agree on is that CSR can have different effects on different financial measurements from accounting-based, stock returns, and an indirect effect through non-financial measurements (Margolis and Walsh, 2003).

From the positive point of view, the indirect effects of CSR can be through an increase in the ability for firms to attract resources (Cochran and Wood, 1984; Waddock and Graves, 1997), employees (Greening and Turban, 2000; Turban and Greening, 1997; Jones, 2010), consumer for its products and services (Fombrun, 1996; Moskowitz, 1972), future opportunities (Fombrun, Gardberg, and Barnett, 2000), consumer loyalty (Sen and Bhattacharya, 2001; Luo and Bhattacharya, 2006), public reputation (Turban and Greening, 1997), interest from financial analysts (Ioannou and Serafeim, 2014) and firm efficiency (Sharma and Vredenburg, 1998). With the indirect effect of CSR Porter (1991); Porter and van der Linde (1995) conclude that high CSR is a competitive advantage strategy. These effects were summarized by Malik (2014) with the value-enhancing theory, that CSR has a positive impact either being direct or indirect, with an increase in competitive advantage and through that add shareholder value. Other researchers have supported this conclusion that firms with higher CSR had higher abnormal returns than those of lower CSR (Osthoff, 2007; Eccles et al., 2014; Galema et al., 2008; Lee et al., 2013). Aouadi and Marsat (2016) evaluated that the firms that showed a positive effect of high CSR on financial

performance. Were more prominent firms, showing overall better financial performance, located in certain countries, higher awareness from the public and followed by more financial analysts.

These connections are not something new, Bragdon and Marlin (1972); Bowman and Haire (1975); Parket and Eilbert (1975) found proof of a direct positive effect between CSR and accounting-based performance. Later supported by Chakravarthy (1986); McGuire, Schneeweis, and Branch (1990), where they used the CSR rating from Fortune magazine, they found that CSR has a positive effect on accounting and return based financial performance measurement. Fernando, Sharfman, and Uysal (2017) explained that a possible reason for why CSR affects financial performance is that CSR can be used to hedge against a particular type of risk. Because firms with high CSR are perceived more sustainable in the long term; however, this can imply lower returns for the investors (Derwall, 2007). Given an example, management skills of a firm are used to determine their CSR score; if management skills are low, it could increase a firm's costs to cope with incoming government fines, lawsuits and even hinder firms from obtaining capital due to reduced CSR scores (Alexander and Bucholtz, 1978; Spicer, 1978).

The no-effect side explained by Alexander and Bucholtz (1978) and backed by Statman and Glushkov (2009); Halbritter and Dorfleitner (2015) state that there is no difference in returns between a firm with high CSR and a firm with low CSR, which is consistent with the efficient market hypothesis. There has also been evidence of no effect of CSR on accounting-based financial performance (Aupperle et al., 1985; Servaes and Tamayo, 2013). Wall (1995) explains why CSR has no-effect on financial performance, if the CSR information is publicly available to everyone and that the information already is fully incorporated into the stock prices.

Statman (2006) try to explain the effect of CSR on financial performance by two arguments, the economic and the discriminatory taste argument. The economic argument is that there are costs and benefits correlated with CSR. However, it is problematic for costs and benefits to be incorporated in the stock price, as it depends on that the information from CSR is fully available to the public. Further, the argument states that the returns of firms with high CSR will be lower if the benefits of CSR are lower than its costs, and if uninformed investors overestimated the benefits or underestimate the costs. Derwall et al. (2005); Edmans (2011) showed that firms with higher

CSR provided positive abnormal returns; they interpreted these higher returns as a mispricing. Dowell et al. (2000) also observed differences in firm value that firms with higher CSR had higher firm value than those firms with lower CSR. Dowell et al. came to the same conclusion that investors underestimate the benefits of CSR or overestimating its costs. The discriminatory taste argument also builds on the relationship between costs and benefits, but instead, what maximizes the investor's utility is investing in firms with higher CSR instead of investing in firms with higher financial performance — implying that stock prices are affected irrespectively of whether CSR is costly or beneficial. In addition to the two arguments, there could be a third argument called the non-sustainability risk argument, that CSR might change the risk profile of a firm by non-sustainability risk in addition to the standard risk measurements. (Statman, 2006)

Boutin-Dufresne and Savaria (2004) researched why some low CSR firms could have higher returns; they explained it with a risk factor scenario that the returns of low CSR firms have higher returns because of a risk premium for the non-sustainability risk. The non-sustainability risk is an environmental risk, product, and commercial practice risk, litigation risk, and investor trust (Becchetti and Ciciretti, 2009). With increased awareness of non-sustainability risk over the years, the premium for the non-sustainability risk has increased. Resulting in a systematic market pricing distortion with higher returns for firms with low CSR, which is also described by the discriminatory taste argument (Hong and Kacperczyk, 2009). Statman and Glushkov (2009); Hong and Kacperczyk (2009) found evidence of this in industries that are considered to be a low CSR industry as alcohol, gambling, tobacco, firearms, military, and nuclear industry. That these firms also can earn positive abnormal returns. Hong and Kacperczyk further explained this as an effect of social norms being a constraint as investor discriminates against firms with low CSR, producing a neglected premium in their risk-adjusted returns. When investors invest in firms with high CSR, it decreases the demand for firms with low CSR and increases their cost of equity.

Some researchers also push on a combination of the economic and discriminatory taste argument, that there are more forces than just the benefits and costs, but also an offset effect for firms having low CSR. Cornell and Shapiro (1987) explained this offset effect by using the stakeholder theory. That low CSR reduces shareholder trust, as low CSR reduces the firm’s ability to honor claims, and could increase the firm’s costs. Alexander and Bucholtz (1978); Bowman and Haire (1975)

evaluated, suggested that a higher CSR factor of management can improve the firms' image and reduce the firm's costs. Some researcher even found that costs are not that significant but rather minuscule, and benefiting the firms by indirect effects on financial performance with increasing employees morale and productivity (Moskowitz, 1972; Parket and Eilbert, 1975; Soloman and Hansen, 1985).

Summarizing the previous studies, the CSRs effect on financial performance is still unclear, and there are no concluding remarks. Ullmann (1985) explains a reason why researcher have found different results regarding CSR and its effects on financial performance. Because of two major issues: first, the results depend on the used methodology and secondly, what measurement the study is using for financial performance.

3. Data and Methodology

This chapter will present the data and the two methods used to research the effects of ESG on financial performance.

3.1 Data

This research follows Halbritter and Dorfleitner (2015) on what CSR measurement to analyze and therefore, in this research, we limit the data to ASSET4. ASSET4 is a rating provider that measures CSR with an ESG score and gathered from Thomson Reuters Datastream. The ESG score consists of three individual pillars Environmental (ENV), Social (SOC), and Governance (GOV). These scores values from 0-100 and are weighted differently to create the ESG score. Looking at Figure 1 below, Thomson Reuters calculates the ESG scores first from different data sources as firm reports to news sources. The data is then divided into their separate pillar, namely ENV, SOC, and GOV and then allocated into their respective subpart. Lastly, the subparts in the pillars are weighted differently for the finished ESG score. (Thomson Reuters ESG Scores, 2019).

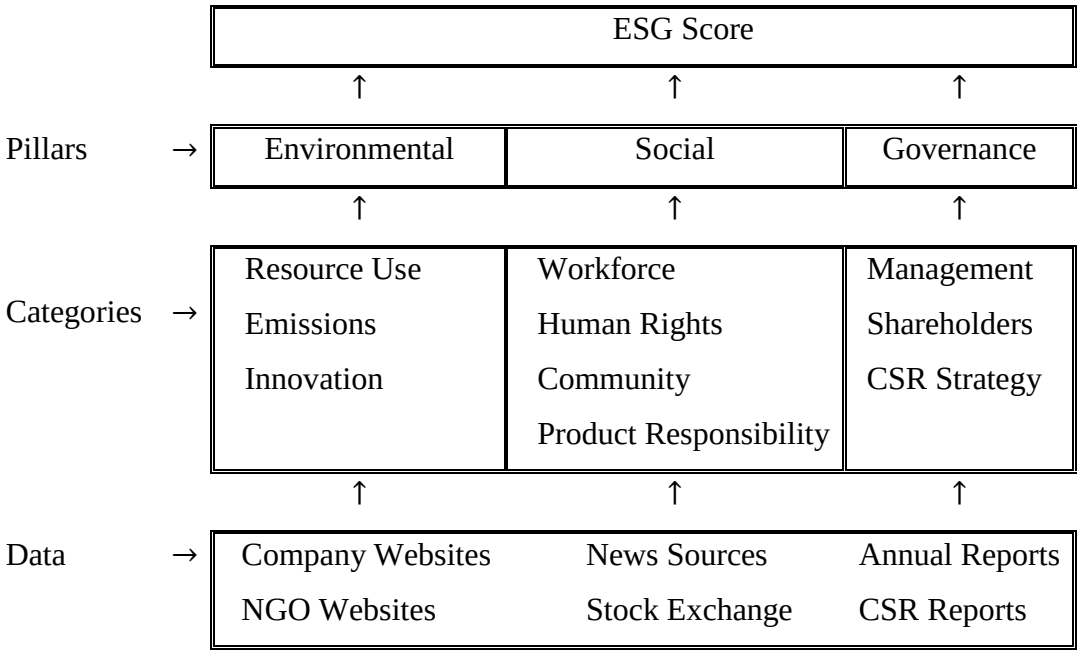

Figure 1: Construction process of ESG

This research uses four different control variables to test the effects of ESG and its pillars on stock returns. The control variables have been based on the control variables Dyck et al. (2019); Chung and Pruitt (1994); Waddock and Graves (1997); Li and Wu (2018) used to test CSRs effect on financial performance. The four control variables are Tobin's Q (TQ), Return on Assets (ROA), the log of Total Assets (TotA) and Leverage (LEV). TQ has shown that it can explain the valuation of firms; therefore, it can help explain stock return changes. The same follows ROA that measures financial performance; commonly used by investors as an indicator of how the firm is performing. TotA is used to capture the size of a firm. LEV can also explain stock returns, but oppositely than previously defined variables with a negative effect on stock returns.

The data have been narrowed down to the firms part of the S&P 500, and the data is collected every month from January 2002 to December 2017, which creates a data set of 192 observations. However, not all of the firms have reported their ESG score from the start of January 2002. Because firms started to report their ESG score at different periods and new firms are introduced into the S&P 500 over the period, hence, creating an unbalanced panel data. Table A1 in the appendix reports the descriptive for the ESG scores, stock returns, and the control variables.

3.2 Regression

The use of panel data to study the ESG scores effect on stock returns instead of cross-sectional or time-series is that panel data offer some specific benefits explained by Baltagi (2008). Which are as follows:

I. Controlling for individual heterogeneity.
II. The data is informative, more variability, less collinearity among the variables, more degrees of freedom, and more efficiency.
III. Better to study the dynamics of adjustment.
IV. Able to identify and measure effects that are not detectable in pure cross-section or pure time-series data.
V. Allowing to construct and test more complicated behavioral models than pure cross-section or time-series data cannot study.
VI. Microdata on firms may be more accurately.
VII. Macro panel data that have problems in time-series.

To analyze panel data, the method of choice is the fixed effects model because of the fixed effect models attributes. It controls for all time-invariant effects as firm characteristics; this is important because there is a possibility that something within the individual firms could impact the predictor and make the predictor biased. It also offers the ability to control for time trends, through using the time fixed effect model; this is crucial to control for as time trends in the data can make the predictor biased, which creates the primary model Equation 1 below.

$$R_{i,t} = \alpha_i + \beta_1(ESG_{i,t}) + \beta_2(SOC_{i,t}) + \beta_3(GOV_{i,t}) + \beta_4(ENV_{i,t}) + \beta_5(TQ_{i,t-1}) + \beta_6(RoA_{i,t-1}) + \beta_7(Ln(TotA)_{i,t-1}) + \beta_8(LEV_{i,t-1}) + \varphi_i + \omega_t + \varepsilon_{i,t} \quad (1)$$

In Equation 1 above, i stands for the firm ranging from $1,2 \ldots 500$ and t stands for the time ranging from $1,2 \ldots ,192$. R is the return for a firm, and α is the intercept. ESG, SOC, GOV, and ENV are the variables of interest. TQ is Tobin's Q, RoA is Return on Assets, $Ln(TotA)$ is log of Total Assets, LEV is the Leverage. φ is the firm dummy variable, and ω is the time dummy variable, and ε is the error term.

There will be a total of five different models, one solo model for every variable of interest (ESG, SOC, GOV, and ENV) and one model with SOC, GOV, and ENV together. The ESG variables will also have three extensions from the baseline model (Equation 1); one of these extensions is the one-year lagged ESG scores. Groening and Kanuri (2013); Bansal et al. (2018) inspired the other two extensions, that is when a change of the ESG occurs either increasing or decreasing in value from one period to the next period. One of these models is when ESG score changed value in the current period from the previous period. The other one is when the change occurred in the one-month lagged period. The five models created will also be used in a robustness test by excluding the financial crisis of 2008-2009. Lins et al. (2017) define the excluding periods from the start of August 2008 to the end of Mars 2009.

Some problems that arise in a panel data study is heteroskedasticity, serial correlation, stationarity, endogeneity, and cross-section dependence. These five problems will be dealt with separate tests and will determine the model specification — The Breusch-Pagan test is used to control for heteroskedasticity in the regressions. The Breusch-Godfrey and the Wooldridge test are both used to test for serial correlation. Because of unbalanced panel data, the Pesaran's CD test is used to test for cross-section dependence, and the Phillips-Perron unit root test is used to test for stationarity. Endogeneity is solved by lagging the control variables by one-month which can be observed in Equation 1. (Baltagi, 2008)

3.3 Fama-French Five-Factor Model

The following two subchapters explain how to construct the risk factors for the Fama-French Five-Factor model and the construction of to ESG portfolios.

3.3.1 Construction of the Fama-French risk factors

Kempf and Osthoff (2007); Bansal et al. (2018); Statman and Glushkov (2009); Lee et al. (2013); Eccles (2014; Galema et al. (2008) studied the effects of CSR on financial performance using the Carhart Four-Factor Model (CFF) which is an extension from the Fama-French Three-Factor Model (FF3). However, few researchers have not used the recently suggested FF5; this makes testing the FF5 interesting, instead of previous established FF3 and CFF. Fama-French (2015) developed the FF3 and built the FF5. Keeping the same structure of the High Minus Low (HML) risk factor but changing the construction of the Small Minus Big (SMB) risk factor and introduced

two new risk factors. One of the new risk factor, called Robust Minus Weak (RMW), is created on the firms operating profitability. The second one is called Conservative Minus Aggressive (CMA), created by the firm's total asset growth. All of the risk factors are first created by dividing firms on their market capitalization, being either small or big (50/50). After this, firms are divided into three groups, depending on their factor rank. An example of how to create the SMB risk factor, firms are divided into three groups low, neutral, or high, depending on their Book-to-Market (BtM) value. Low is the group of firms on the 30 percentile and below, neutral is the group of firms between the 30 and the 70 percentile, and the high group is firms on the 70 percentile, and above, this construction is conducted both for small and big firms. This percentile system follows for all other risk factors, but with individual group names. Equation 2 below shows how to construct the SMB risk factor.

$$SMB_{(B/M)} = \frac{(S/L + S/N + S/H) - (B/L + B/N + B/H)}{3} \quad (2)$$

$SMB_{(B/M)}$ is the average returns of the small firms minus the big firms, regarding their BtM value. Where S/L are small firms in the low BtM group, S/N are small firms in the neutral BtM group, and S/H are small firms in the high BtM group. B/L are big firms in the low BtM group, B/N are big firms in the neutral BtM group, and B/H are big firms in the high BtM group. Equations 3-4 to follow, shows how to construct the other two risk factors needed to create the FF5 SMB risk factor.

$$SMB_{(OP)} = \frac{(S/W + S/N + S/R) - (B/W + B/N + B/R)}{3} \quad (3)$$

$SMB_{(OP)}$ is the average returns of the small firms minus the large firms, regarding their operating profitability. Where S/W are small firms in the weak operating profitability group, S/N are small firms in the neutral operating profitability group, and S/R are small firms in the robust operating profitability group. B/W are big firms in the weak operating profitability group, B/N are big firms in the neutral operating profitability group, and B/R are big firms in the robust operating profitability group.

$$SMB_{(INV)} = \frac{(S/C + S/M + S/A) - (B/C + B/M + B/A)}{3} \quad (4)$$

$SMB_{(INV)}$ is the average returns of the small firms minus the large firms, regarding their total asset growth. Where S/C are small firms in the conservative total asset growth group, S/M are small firms in the medium total asset growth group, and S/A are small firms in the aggressive total asset growth group. B/C are big firms in the conservative total asset growth group, B/M are big firms in the medium total asset growth group, and B/A are big, firms in the aggressive total asset growth group. The factors created from Equation 2-4 are then used in Equation 5 below, to create the SMB risk factor for FF5.

$$SMB_{(FF5)} = \frac{\left(SMB_{(B/M)} + SMB_{(OP)} + SMB_{(INV)}\right)}{3} \quad (5)$$

$SMB_{(FF5)}$ is the FF5 SMB risk factor, which is the average returns of $SMB_{(B/M)}$, $SMB_{(OP)}$and $SMB_{(INV)}$. Equation 6-8 that follows shows the construction of the other three risk factors HML, RMW, and CMA needed in the FF5.

$$HML = \frac{(S/H + B/H) - (S/L + B/L)}{2} \quad (6)$$

HML is the average returns of firms with high BtM minus firms with low BtM.

$$RMW = \frac{(S/R + B/R) - (S/W + B/W)}{2} \quad (7)$$

RMW is the average returns of firms with robust minus firms with weak operating profitability.

$$CMA = \frac{(S/C + B/C) - (S/A + B/A)}{2} \quad (8)$$

CMA is the average returns of firms with conservative minus firms with aggressive total assets growth. Each month the average returns of the SMB, HML, and RMW are calculated, and the groups are created depending on the firms' respective factor one-year back. Similar for CMA but by taking total asset one year back divided by total asset two years back. After the construction of the risk factors, FF5 can be constructed, which can be observed below in Equation 9.

$$R_{i,t} - Rf_t = \alpha_i + \beta_1(Rm_t - Rf_t) + \beta_2\left(SMB_{(FF5),t}\right) + \beta_3(HML_t) + \beta_4(RMW_t) + \beta_5(CMA_t) + \varepsilon_{i,t} \quad (9)$$

Where i is the portfolio and t is the time, R is the return for a portfolio, Rf is the risk-free return, and $R - Rf$ is the excess return of a portfolio. α is the intercept, also known as alpha or abnormal return, Rm is the return of the market, and $Rm - Rf$ is the excess return of the market. The Kenneth R. French Data Library (2019) is used to collect the FF5 risk factors and the risk-free rate; Table A2 in the appendix shows the descriptive for the risk factors.

The FF5 mimicked portfolio can show some exciting features for the portfolio given α and individual β. Looking on the right-hand side on Equation 9 following left to right. If $\alpha > 0$ the portfolio is earning abnormal returns to the market portfolio and opposite if $\alpha < 0$. β_1 shows the systematic risk of the portfolio. If $\beta_1 < 0$ this indicates that the portfolio has a negative correlation with the market portfolio, and $\beta_1 > 0$ indicates that there is some positive correlation with the market portfolio. For the other risk factors (SMB, HML, RMW, and CMA) respective β tells something interesting on the portfolio construction. An example for SMBs β, if $\beta_2 > 0$ the portfolio is constructed on small firms and the opposite if $\beta_2 < 0$. This system of construction follows for the other risk factors, that if $\beta > 0$ the portfolio is constructed on firms with the first letter/word and if $\beta < 0$ the construction of the portfolio is on firms with the last letter/word in that risk factor.

3.3.2 Construction of the ESG portfolios

The portfolios used in this research are constructed on the same system as Fama-French creates their risk factors. That is, the firms are divided into three portfolios depending on their ESG score and then grouped into low, medium, and high ESG score portfolio. These three portfolios are called

LESG (firms with low ESG score), MESG (firms with medium ESG score), and HESG (firms with high ESG score). Another portfolio is also constructed to test if firms with high ESG score outperform firms with low ESG score, that is HESG minus LESG and is called HMLESG. Important to notice is that the LESG, MESG, HESG, and HMLESG are zero investment strategy portfolios, implying taking long positions on the firms with given strategy and shorting the risk-free rate. For HMLESG, this implies taking long positions for firms with high ESG and shorting firms with low ESG score. The portfolios also follow the same idea as the risk factors; calculating the returns every month for the portfolios, and the portfolios are created depending on the firms ESG scores one year back. The groups stay the same for one year, and after one year, the portfolios are reconstructed based on the firms new ESG score. Table A3 in the appendix shows the descriptive for the four portfolios.

The FF5 will also be tested with a robustness test and excluding the same periods as in the fixed effect method (August 2008 to the end of Mars 2009). Also, the results include the SR for the induvial portfolios. Because, SR is commonly used in portfolio analysis as it measures the performance of a portfolio by risk-adjusted returns, i.e., it reports the excess return of a portfolio per unit of standard deviation. However, some problems also arise in time-series regressions as heteroskedasticity, stationarity, serial correlation, and multicollinearity — Breusch-Pagan test is used to test for heteroskedasticity in the regressions. Durbin-Watson and the Breusch-Godfrey test are used to test for serial correlation. Augmented Dickey-Fuller and the Phillips-Perrrson unit root test are used to test for stationarity and the correlation matrix and the variance inflation factor test for multicollinearity between the independent variables.

4. Results

This chapter reports the results for the two methods. First, it reports the results from the specific method and then follows a translation of the results in a subchapter.

4.1 Fixed effect

The Tables A4-A5 in the appendix show the results from the diagnostics; these results support the use of robust standard errors in all of the models to control for heteroskedasticity and serial correlation. However, there is no problem with stationarity and cross-dependency in the data. Table 1 below shows the results for the fixed effect method.

Table 1: Full Period – Fixed Effect Converted

The table is a simplification of Tables A6-A9 found in the appendix these four tables have been converted to this new table and shows the regressions from the periods 2002 through 2017. It shows the Primary (1A-5A) model without altering the ESG scores. The One-Year Lagged Primary (1B-5B) model is the one-year lagged ESG scores. The Change Study (1C-5C) model is the change of the ESG scores in the current period. Lagged Change Study (1D-5D) model is the one-month lagged change of the ESG scores. (The abbreviations shown in Table 1 is the same for the Tables A6-A17 in the appendix).

Primary						One-Year Lagged Primary					
	1A	2A	3A	4A	5A		1B	2B	3B	4B	5B
ESG	0.012					ESG_{t-12}	0.000				
	(0.022)						(0.018)				
SOC		0.009	0.006			SOC_{t-12}		0.022	-0.009		
		(0.023)	(0.019)					(0.022)	(0.016)		
CG		-0.052		-0.044		CG_{t-12}		0.013		-0.008	
		(0.033)		(0.031)				(0.02)		(0.016)	
ENV		-0.012			-0.012	ENV_{t-12}		-0.024			-0.021
		(0.02)			(0.017)			(0.019)			(0.016)
Change Study						Lagged Change Study					
	1C	2C	3C	4C	5C		1D	2D	3D	4D	5D
ΔESG	**0.122****					ΔESG_{t-1}	0.011				
	(0.055)						(0.05)				
ΔSOC		0.019	0.047			ΔSOC_{t-1}		-0.043	0.039		
		(0.083)	(0.057)					(0.071)	(0.051)		
ΔCG		0.047		0.06		ΔCG_{t-1}		0.091		**0.09***	
		(0.079)		(0.056)				(0.072)		(0.053)	
ΔENV		-0.136			-0.029	ΔENV_{t-1}		-0.001			0.049
		(0.086)			(0.059)			(0.072)			(0.054)

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The values in the table are the original values multiplied by 1000.

Table 1 above, reports that none of the ESG scores are significant in the Primary and One-Year Lagged Primary model. In the other models, ESG in 1C and GOV in 4D are positive and significant. Tables A10-A17 in the appendix reports the results from the period before and after the financial crisis. The period before the crisis supports the positive and significant GOV in 4D but does not support ESG in 1C. Overall the period before the crisis has positive and significant ESG in 1B and SOC in 2B while GOV in 4B and ENV in 5B are negative and significant. It also reports that GOV in 2C and 2D are positive and significant. The period after the financial crisis

does not support any of the significant variables in Table 1. Overall the period after the crisis reports positive and significant SOC in 2A while GOV and ENV are negative and significant in 2A. The period after the crisis also reports negative and significant GOV in 4A and ENV in 5A, 2B, and 5B.

4.1.1 ESGs impact on stock performance

There is little support, almost no support for that ESG, and its pillars affect stock returns. The lagged change study model for GOV has a significant positive effect, both in the full period model and in the period before the crisis. Both show a positive impact; however, GOV in full period model has a lesser impact than the period before the crisis on stock returns. An interesting remark is that the period before the crisis and the period after the crisis, both support ENV in the One-Year Lagged Primary model. Both with a negative effect, where ENV in the period after the crisis has a higher impact on stock returns. Overall, the models do not show similarities in significance for the variables over the three periods; some variables only have an impact in just one of the periods. It can be observed for when there is a change of GOV in the period before the crisis, as GOV had strong evidence of having a positive and significant effect on stock returns; however, in the period after the crisis, this was not the case. The same pattern follows for the period after the crisis for the primary and the one-year lagged primary model, where GOV and ENV had a negative and a significant effect on stock returns; however, again in the other periods, this was not the case. The results show two remarks. One, there is no convincing evidence that ESG and its pillar effect on stock returns. Two, the financial crisis has disrupted ESG and its pillars effect on stock return, from significant to insignificant and vice versa. Therefore, we state there is no reliable evidence that ESG and its pillars have any significant power to explain stock returns.

4.2 Fama-French Five-Factor Portfolios

The Tables A18-A21 in the appendix show the results from the diagnostics; these results support the use of robust standard errors for the HESG, MESG, and LESG to control for heteroskedasticity while HMLESG has no problem with heteroskedasticity. None, of the models, have problems with serial correlation, stationarity, and multicollinearity. Table 2 below shows the results for the FF5 method.

Table 2: Full Period – Portfolio Simplified

The table is a simplification of Table A22 found in the appendix and shows the regression from the periods 2002 through 2017. It reports the α and the five risk factors and the Sharpe ratio (SR) for the individual portfolios HMLESG, HESG, MESG, and LESG.

	HMLESG	HESG	MESG	LESG
α	-0.0015	-0.0022**	-0.0029**	-0.0007
	(0.0011)	(0.001)	(0.0012)	(0.0017)
$R_m - R_f$	-0.0353	1.0066***	1.0784***	1.042***
	(0.0327)	(0.0416)	(0.04918)	(0.0735)
SMB	-0.2531***	0.0181	0.178***	0.2712***
	(0.0523)	(0.0348)	(0.0508)	(0.0681)
HML	-0.1226**	0.0186	0.1311***	0.1412
	(0.0512)	(0.0379)	(0.0485)	(0.0872)
RMW	0.0307	0.1296**	0.1527*	0.0989
	(0.0729)	(0.0577)	(0.0839)	(0.1255)
CMA	0.3577***	-0.021	-0.1819**	-0.3867**
	(0.0864)	(0.0688)	(0.082)	(0.1586)
SR	-0.457	0.542	0.498	0.614

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 2 above reports that the α is negative and significant in the portfolios HESG and MESG. While $R_m - R_f$ is positive and significant in the portfolios HESG, MESG, LESG, and not significant in the HMLESG. The SMB risk-factor is different over the four portfolios, wherein the HMLESG it is negative and significant, not significant in HESG, and positive and significant in MESG and LESG. HML follows a similar pattern, where it is negative and significant for HMLESG, but not significant in HESG and LESG and, positive and significant in MESG. The RMW risk-factor is positive for all the portfolios but only significant in HESG and MESG. The last risk factor CMA is negative and significant in MESG and LESG except in the HMLESG it is positive and significant and not significant in HESG. The performance measurement SR is positive in HESG, MESG, and LESG, but again HMLESG behaves differently and has a negative SR

The Tables A23-A24 in the appendix reports the two-robustness test conducted. The negative and significant α in Table 1 is only supported in the period after the financial crisis in HESG and MESG, but it is also negative and significant in HMLESG. The two-robustness test support the positive and significant $R_m - R_f$ in HESG, MESG, and LESG in Table 1, but smaller values in the period before the crisis. The significance for SMB in HMLESG, HESG, and LESG are all supported in the period after the crisis but before the crisis HMLESG is the only portfolio where SMB is still significant and negative and also closer to zero. For HML none of the robustness periods show any support in the portfolios. The two new risk factors RMW and CMA are only supported in the period after the crisis. However, RMW is supported only in the HESG portfolio and CMA in the HMLESG portfolio but vastly smaller. Two two-robustness periods show similarly reports of the portfolios SR, with the same sign, but vastly different in size. The period before the crisis shows SR closer to zero and the period after the crisis shows that SR has a significant deviation from zero.

4.2.1 The differences between the portfolios

The results from the FF5 show that firms with low ESG score outperform those with higher ESG score, both observed in the HMLESG portfolio and when comparing the portfolios HESG and LESG. The HMLESG portfolio in the period after the crisis exhibits negative abnormal return; however, not supported in the other two periods. The portfolio also has a negative SR in all of the periods, and it even decreased more over the periods, the portfolio also has the lowest SR compared to the other portfolios. Comparing the portfolios HESG and LESG. First, the HESG has negative abnormal returns both in the full period and in the period after the crisis, while LESG reports no abnormal returns over the periods. Secondly, HESG has lower SR than the LESG in the full period and the period after the crisis, but HESG has a higher SR than the LESG before the crisis. Thirdly, the systematic risk for the two portfolios is almost the same over the periods; the most significant difference is in the period before the crisis when HESG had a smaller value than the LESG portfolio.

The construction of the HMLESG portfolio is on firms with larger market capitalization; this composition increased from the period before the crisis to the period after the crisis. SMB is only significant in the full period; the portfolio construction is on firms with low BtM value. There is

also significant evidence for that the construction of the portfolio is on firms that have conservative total asset growth in the full period and the period after the crisis, where the period after the crisis the construction on firms with conservative total asset growth was remarkably lower. The construction of the HESG portfolio is on firms with robust operating profitability in the full period and the period after the crisis. Lastly, the construction of the LESG portfolio stays the same in the full period model and the period after the crisis, on firms that have small market capitalization, and constructed on firms with aggressive total asset growth in the full period model.

The MESG portfolio behaves differently. In the full period model, it shows negative abnormal returns; this is also the case in the period after the crisis. It had a lower negative abnormal return in the full period than the HESG, but in the period after the crisis, it had a negative abnormal return closer to zero than the negative abnormal returns for HESG. This portfolio also exhibits higher systematic risk over all the periods compared to the other portfolios, and it is increasing from the period before the crisis to the period after the crisis, and SR for the portfolio followed the same pattern. Comparing the MESGs SR with HESGs and LESGs SR, MESG has the lowest SR in the full period, in the period before the crisis, but in the period after the crisis, it exhibits higher SR than HESGs SR. Regarding the construction of the MESG portfolio, in the full period, the construction of the portfolio is on firms with smaller market capitalization and supported in the period after the crisis. In the full period, the construction of the portfolio is on firms that have higher BtM, robust operating profitability, and aggressive total asset growth, however, there is no significant evidence for this in the other periods.

Overall, we can find some interesting results between portfolios with high and low ESG score. First, the portfolio with low ESG score outperforms portfolios with higher ESG score. Secondly, portfolios constructed on higher ESG score shows negative abnormal returns. Thirdly, portfolios with low ESG score shows a similar systematic risk to the portfolios constructed on high ESG score. Fourthly, the portfolio created on firms with medium ESG score shows the same construction as the portfolio created on low ESG score, but the low ESG score portfolio has a significant higher construction of that firm structure. Lastly, the financial crisis has altered that portfolios with high ESG score from outperforming portfolios with low ESG score to underperform against the portfolio with low ESG score. Through higher ESG score portfolios

starting to exhibit negative abnormal returns, altered the portfolios systematic risk and making the systematic risk more similar over the portfolios and shifted so that the lower ESG portfolio had higher SR than the portfolios created with higher ESG score.

5. Discussion

We have found that the ESG scores show no overall significant effect on stock returns over the full period. Which was also the case for Alexander and Bucholtz (1978); Statman and Glushkov (2009); Halbritter and Dorfleitner (2015) that found no relationship between ESG and higher stock returns. In contrast, Branch (1987); Galema et al. (2008) found a positive connection between CSR and financial performance. There is some support for the significance of the one-year lagged ENV, in the two periods excluding the full period. Derwall et al. (2005); Galema et al. (2008); Malik (2014) also found a relationship between financial performance and the environmental factor through the value-creating capabilities of the environmental factor, however, they found a positive effect of ENV on financial performance and we found a negative effect on stock performance.

The results from the portfolios give a more in-depth understanding of the results. We found that the portfolio constructed on lower ESG score outperforms the portfolio constructed with high ESG score. The reason for this is that the high ESG portfolio is subject to negative abnormal returns, overall no difference between the portfolios systematic risk, lower SR and even negative SR in the portfolio going long on firms with high ESG score and shorting firms with low ESG score. This result is different from Kempf and Osthoff (2007); Lee et al. (2013); Eccles et al. (2014); Bansal et al. (2018) through using the CFF they found that the portfolio with high ESG score had higher abnormal returns than the portfolio with low ESG score. Also, the results from the research do not support Halbritter and Dorfleitner (2015) that there is no difference in returns between the high and low ESG score portfolios.

Therefore, the results are supporting what McWilliams and Siegel (1997); Jensen (2002); Tirole and Bénabou (2010) found, that higher ESG diverts from maximizing financial performance, and the reason for this could be due to the costs of high ESG, which could be explained by the economic and discriminatory taste argument and the risk factor scenario. The economic argument that the costs exceed the benefits could be one reason for the result. Because investors overestimate the

benefits of high ESG or underestimated the costs of high ESG and these costs could be one of the reasons why the high ESG score portfolio has negative abnormal returns. Creating an environment where the high ESG score stocks exhibit mispricing that Derwall et al. (2005); Edmans (2011); Dowell et al. (2000) supported. However, the results in this research are not supporting the offset effect that the costs are minuscule. Because of two major results; first, the higher ESG portfolio has negative abnormal returns, which could be part of the higher costs from having high ESG. Secondly, if the costs were minuscule, the portfolio with higher ESG should not be outperformed by the portfolio with lower ESG (Moskowitz, 1972; Parket and Eilbert, 1975; Soloman and Hansen, 1985).

The discriminatory taste argument and the rapid increase of ESG investing over the last 5 years could offer some support to the results. As Hong and Kacperczyk (2009) explain it, when divestment occurs for firms with low ESG, these firms exhibit a higher cost of equity, in turn creating higher returns for the investors. It could also support the opposite direction, that firms with high ESG score have gotten more attention over the last 5 years, creating a high ESG score market that decreased firms' costs of equity. These ideas supported the change of the performance for the high ESG portfolio and the low ESG portfolio from the period before the crisis to the period after the crisis. In a sense, the high ESG score market has stagnated, making it less efficient and flooded by the supply of money.

The risk factor argument is harder to observe in the results, as the portfolio with low ESG score has a higher SR, and the difference of systematic risk between the high ESG portfolio and the low ESG portfolio have decreased over the periods. Why the low ESG portfolio has higher returns could be due to the non-sustainability risk, which Boutin-Dufresne and Savaria (2004) discussed. This as low ESG portfolio has higher risk premium associated with the unobserved non-sustainability risk factor. What also supports this concept is the gain of awareness of non-sustainability over the years, observed in the change of the portfolio's performance over the periods and higher returns for the low ESG portfolio could be that the risk premium increased, the discriminatory taste argument shows a similar explanation of this phenomenon. Also, as Derwall (2007) finds that a possible explanation of that higher ESG portfolio has lower returns are that there exists some underlying non-observed non-sustainability risk factor, that investors want to

hedge. Therefore, the investors accept the lower returns from the portfolio with high ESG as they are perceived to be less risky in long-term than the portfolio with low ESG.

An interesting remark is that the effect of ESG on stock returns and the performance of the portfolios has changed over the periods. Bansal et al. (2018) support these results as they found that the power of the abnormal returns and significant power of other variables changed over the periods. They reasoned for that the financial crisis disrupted the performance of the portfolios constructed with ESG score. They also reasoned that the provider for ESG affects the results when studying the ESGs effect on financial performance. They showed this by studying three different rating providers ESG data (ASSET4, Bloomberg, and KLD); their results showed that ESG from the different provider had different results. Therefore, it becomes more apparent why the results in this research could be so different from other studies because other studies are using different rating provider for ESG data and studying ESG on a different period.

6. Conclusion

This study has tested two different methods on the ESGs effect on financial performance in the S&P 500. One method is to study if ESG can affect stock returns and one if different portfolios constructed on ESG score behave differently, and if so, how. What has been found through the fixed effect model is that there is little evidence that supports that ESG has a direct effect on stock returns, with non-overwhelming proof that the one-month lagged change of GOV has a positive effect on stock returns and that one-year lagged of ENV has a negative effect stock return. From the fixed effect result, evidence has shown that the financial crisis that occurred 2008-2009 had an impact on the ESGs effect on stock return. Which suggest that when testing the ESG effect on stock return, it is crucial to consider post or pre the financial crisis.

The different portfolios constructed on different ESG scoring shows reliable results that a portfolio constructed on firms with higher ESG score has a negative abnormal return. A portfolio constructed on going long on firms with high ESG score and going short on firms with low ESG score creates a portfolio with negative SR and negative abnormal returns. The best strategy to maximize financial performance is to construct a portfolio on firms with low ESG score, as it has similar systematic risk as a portfolio with higher ESG score, higher SR and no signs of negative

abnormal returns. Another interesting result that is needed to take into consideration is that the behavior of the portfolios created on different ESG score has changed after the financial crisis, both in systematic risk, SR and higher ESG score portfolios started to report negative abnormal returns.

This research has found support from three major arguments. One, the economic argument, that investors overestimate the benefits of ESG and/or underestimate its costs. Second, the rise of high ESG investing and discriminatory taste argument, that costs of equity have decreased for high ESG firms and increased for low ESG firms. Lastly, the unobserved non-sustainability risk has increased the risk premium for low ESG, and that this risk has made the investors accept lower returns from high ESG firms.

What is essential for future researcher to take from this study is that the method is a central feature and also that the results differ significantly depending on the period. Therefore, the future researcher should conduct an in-depth analysis of ESGs power on financial performance after the financial crisis 2008-2009 and also during the crisis. To find evidence that can explain why high ESG score portfolio started to underperform against the low ESG score portfolio. Also, to find evidence that explains why ESG and its pillars changed there significant effect on stock returns.

7. References

Alexander, G. and Buchholz, R. (1978). Corporate Social Responsibility and Stock Market Performance. *Academy of Management Journal*, 21(3), pp.479-486.

Aouadi, A. and Marsat, S. (2016). Do ESG Controversies Matter for Firm Value? Evidence from International Data. *Journal of Business Ethics*, 151(4), pp.1027-1047.

Aupperle, K., Carroll, A. and Hatfield, J. (1985). An Empirical Examination of the Relationship between Corporate Social Responsibility and Profitability. *Academy of Management Journal*, 28(2), pp.446-463.

Baltagi, B. (2008). *Econometric analysis of panel data*. 4th ed. Chichester, UK: John Wiley & Sons.

Bansal, R., Wu, D. and Yaron, A. (2018). Is Socially Responsible Investing A Luxury Good?. Working Paper, Duke University, University of Michigan, and University of Pennsylvania.

Barnea, A. and Rubin, A. (2010). Corporate Social Responsibility as a Conflict Between Shareholders. *Journal of Business Ethics*, 97(1), pp.71-86.

Becchetti, L. and Ciciretti, R. (2009). Corporate social responsibility and stock market performance. *Applied Financial Economics*, 19(16), pp.1283-1293.

Boutin-Dufresne, F. and Savaria, P. (2004). Corporate social responsibility and financial risk. *Journal of Investing*, 13(1), pp.57-66.

Bowman, E. and Haire, M. (1975). A Strategic Posture toward Corporate Social Responsibility. *California Management Review*, 18(2), pp.49-58.

Bragdon, J. and Marlin, J. (1972). Is pollution profitable?. *Risk Management*, 19(4), pp.9-18.

Chakravarthy, B. (1986). Measuring strategic performance. *Strategic Management Journal*, 7(5), pp.437-458.

Chung, K. and Pruitt, S. (1994). A Simple Approximation of Tobin's Q. *Financial Management*, 23(3), pp.70-74.

Cochran, P. and Wood, R. (1984). Corporate Social Responsibility and Financial Performance. *Academy of Management Journal*, 27(1), pp.42-56.

Cornell, B. and Shapiro, A. (1987). Corporate stakeholders and corporate finance. *Financial Management*, 16(1), pp.5-14.

Derwall, J. (2007). *Economic virtues of SRI and CSR*. Ph.D. dissertation, University of Maastricht.

Derwall, J., Guenster, N., Bauer, R., and Koedijk, K. (2005).The eco-efficiency premium puzzle. *Financial Analysts Journal*, 61(2), pp.51-63

Dowell, G., Hart, S. and Yeung, B. (2000). Do Corporate Global Environmental Standards Create or Destroy Market Value?. *Management Science*, 46(8), pp.1059-1074.

Dyck, A., Lins, K., Roth, L. and Wagner, H. (2019). Do institutional investors drive corporate social responsibility?. International evidence. *Journal of Financial Economics*, 131(3), pp.693-714.

Eccles, R., Ioannou, I. and Serafeim, G. (2014). The Impact of Corporate Sustainability on Organizational Processes and Performance. *Management Science*, 60(11), pp.2835-2857.

Edmans, A. (2011). Does the stock market fully value intangibles? Employee satisfaction and equity prices. *Journal of Financial Economics*, 101(3), pp.621-640.

Fama, E. and French, K. (2015). A five-factor asset pricing model. *Journal of Financial Economics*, 116(1), pp.1-22.

Fernando, C., Sharfman, M. and Uysal, V. (2017). Corporate Environmental Policy and Shareholder Value: Following the Smart Money. *Journal of Financial and Quantitative Analysis*, 52(5), pp.2023-2051.

Fombrun, C. (1996). *Reputation: Realizing Value from the Corporate Image*. Harvard Business School Press: Boston, MA.

Fombrun, C., Gardberg, N. and Barnett, M. (2000). Opportunity Platforms and Safety Nets: Corporate Citizenship and Reputational Risk. *Business and Society Review*, 105(1), pp.85-106.

Friedman, M. (1970). *The social responsibility of business is to make profit*. New York Times Magazine.

Galema, R., Plantinga, A. and Scholtens, B. (2008). The stocks at stake: Return and risk in socially responsible investment. *Journal of Banking & Finance*, 32(12), pp.2646-2654.

Greening, D. and Turban, D. (2000). Corporate Social Performance As a Competitive Advantage in Attracting a Quality Workforce. *Business and Society*, 39(3), pp.254-280.

Groening, C. and Kanuri, V. (2013). Investor reaction to positive and negative corporate social events. *Journal of Business Research*, 66 (10), pp.1852-1860.

Halbritter, G. and Dorfleitner, G. (2015). The wages of social responsibility — where are they? A critical review of ESG investing. *Review of Financial Economics*, 26(3), pp.25-35.

Hong, H. and Kacperczyk, M. (2009). The price of sin: the effects of social norms on markets. *Journal of Financial Economics*, 93(1), pp.15-36.

Ioannou, I. and Serafeim, G. (2014). The impact of corporate social responsibility on investment recommendations: Analysts' perceptions and shifting institutional logics. *Strategic Management Journal*, 36(7), pp.1053-1081.

Jensen, M. (2002). Value Maximization, Stakeholder Theory, and the Corporate Objective Function. *Business Ethics Quarterly*, 12(2), pp.235-256.

Jones, D. (2010). Does serving the community also serve the company? using organizational identification and social exchange theories to understand employee responses to a volunteerism programme. *Journal of Occupational and Organizational Psychology*, 83(4), pp.857-878.

Kell ,G. (2019). *The Remarkable Rise Of ESG*. [online] Available at: https://www.forbes.com/sites/georgkell/2018/07/11/the-remarkable-rise-of-esg/#57c781251695 [Accessed 19 May 2019].

Kempf, A. and Osthoff, P. (2007). The Effect of Socially Responsible Investing on Portfolio Performance. *European Financial Management*, 13(5), pp.908-922.

Kenneth R. French Data Library (2019). *Kenneth R. French - Data Library*. [online] Available at: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html [Accessed 1 May 2019].

Lee, D., Faff, R. and Rekker, S. (2013). Do high and low-ranked sustainability stocks perform differently?. *International Journal of Accounting & Information Management*, 21(2), pp.116-132.

Li, J. and Wu, D. (2018). Corporate Social Responsibility Engagements Lead to Real Environmental, Social and Governance Impact? *Ross School of Business Paper*, No. 1335.

Lins, K., Servaes, H. and Tamayo, A. (2017). Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance*, 72(4), pp.1785-1824.

Luo, X. and Bhattacharya, C. (2006). Corporate Social Responsibility, Customer Satisfaction, and Market Value. *Journal of Marketing*, 70(4), pp.1-18.

Malik, M. (2014). Value-Enhancing Capabilities of CSR: A Brief Review of Contemporary Literature. *Journal of Business Ethics*, 127(2), pp.419-438.

Margolis, J. and Walsh, J. (2003). Misery Loves Companies: Rethinking Social Initiatives by Business. *Administrative Science Quarterly*, 48(2), pp.268-305.

McGuire, J., Schneeweis, T. and Branch, B. (1990). Perceptions of Firm Quality: A Cause or Result of Firm Performance. *Journal of Management*, 16(1), pp.167-180.

Mcwilliams, A. and Siegel, D. (1997). The Role of Money Managers in Assessing Corporate Social Reponsibility Research. *The Journal of Investing*, 6(4), pp.98-107.

Moskowitz, M. (1972). Choosing socially responsible stocks. *Business and Society Review*, 1, pp.71-75.

Parket, I. and Eilbirt, H. (1975). The practice of business social responsibility: the underlying factors. *Business Horizons*, 18(4), pp.5-10.

Porter, M. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, 12(S2), pp.95-117.

Porter, M. and Van der Linde, C. (1995). Green and Competitive: Ending the Stalemate. *Harvard Business Review*, 73(5), pp.121-134.

Sen, S. and Bhattacharya, C. (2001). Does Doing Good Always Lead to Doing Better? Consumer Reactions to Corporate Social Responsibility. *Journal of Marketing Research*, 38(2), pp.225-243.

Servaes, H., and Tamayo, A. (2013). The impact of corporate social responsibility on firm value: The role of customer awareness. *Management Science*, 59(5), pp.1045-1061.

Sharma, S. and Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal*, 19(8), pp.729-753.

Soloman, R., and Hansen, K. (1985). *It's good business*. New York: Atheneum.

Spicer, B. (1978). Investors, corporate social performance, and information disclosure: An empirical study. *Accounting Review*. 53(1), pp.94-111.

Statman, M. (2006). Socially Responsible Indexes. *The Journal of Portfolio Management*, 32(3), pp.100-109.

Statman, M. and Glushkov, D. (2009). The Wages of Social Responsibility. *Financial Analysts Journal*, 65(4), pp.33-46.

Thomson Reuters ESG Scores (2019). Refinitiv.com. [online] Available at: https://www.refinitiv.com/content/dam/marketing/en_us/documents/methodology/esg-scores-methodology.pdf [Accessed 17 Apr. 2019].

Tirole, J. and Bénabou, R. (2010). Individual and Corporate Social Responsibility. *Economica*, 77(305), pp.1-19.

Turban, D. and Greening, D. (1997). Corporate Social Performance And Organizational Attractiveness To Prospective Employees. *Academy of Management Journal*, 40(3), pp.658-672.

Ullmann, A. (1985). Data in Search of a Theory: A Critical Examination of the Relationships Among Social Performance, Social Disclosure, and Economic Performance of U.S. Firms. *Academy of Management Review*, 10(3), pp.540-557.

US SIF. (2019). *US SIF Foundation Releases 2018 Biennial Report On US Sustainable, Responsible And Impact Investing Trends*. [online] Ussif.org. Available at: https://www.ussif.org/blog_home.asp?display=118 [Accessed 20 May 2019].

Waddock, S. and Graves, S. (1997). The corporate social performance - financial performance link. *Strategic Management Journal*, 18(4), pp.303-319.

Wall, L. (1995). Some lessons from basic finance for effective socially responsible investing. *Economic Review – Federal Reserve Bank of Atlanta*, 80(1), pp.1-12.

8. Appendix

Table A1: Descriptive for data

	N	Min	Max	Median	Mean	Std
ESG	78102	7.19	95.59	42.77	45.87402	15.59943
SOC	78102	3.58	99.34	61.86	57.56395	28.70989
GOV	78102	1.62	98.18	82.32	78.57988	15.30368
ENV	78102	8.12	97.39	57.19	53.90015	32.55715
R	87432	-0.85	2.60	0.012	0.011893	0.091953
TQ	87718	0.029	22.32	1.371	1.727547	1.390225
RoA	90313	-104.18	104.52	6.54	7.040743	8.524489
LnTotA	91676	4.49	9.41	7.06	7.073662	0.691089
LEV	95500	0.00	22.32	1.28	1.575639	1.411479

Table A2: Descriptive for the FF5 risk factors

	N	Min	Max	Median	Mean	Std
$R_m - R_f$	180	-0.1723	0.1135	0.0124	0.008166	0.039509
SMB	180	-0.0478	0.0687	0.0015	0.002177	0.023720
HML	180	-0.1110	0.0832	-0.0017	0.000531	0.024605
RMW	180	-0.0692	0.0508	0.0027	0.001961	0.017526
CMA	180	-0.0334	0.0363	-0.0006	0.000478	0.014121

Table A3: Descriptive for the Portfolios used in the FF5

	N	Min	Max	Median	Mean	Std
HMLESG	180	-0.074841	0.071001	-0.002816	-0.002136	0.016184
HESG	180	-0.218431	0.111208	0.012630	0.006332	0.040448
MESG	180	-0.247315	0.156569	0.009202	0.006599	0.045902
LESG	180	-0.280817	0.185469	0.016164	0.008468	0.047766

Table A4: Diagnostics – Fixed Effects

The table shows the test scores for Breusch-Pagan test (heteroskedasticity), Breusch-Godfrey test (serial correlation), Wooldridge test (serial correlation) and Pesaran CD (cross-section dependence). The results show that all of the models exhibit problems with heteroskedasticity and serial correlation, but no problem with cross-section dependence.

	Breusch-Pagan	Breusch-Godfrey	Wooldridge	Pesaran CD
ESG	5592.1***	232.84***	5.4661**	1.5829
SOC+GOV+ENV	5753.1***	233.29***	5.4808**	1.5799
SOC	5478.9***	232.75***	5.4631**	1.5804
GOV	5701.6***	233.66***	5.5061**	1.5834
ENV	5330.5***	232.83***	5.4724**	1.5785

Note: *** p<0.01, ** p<0.05, * p<0.1.

Table A5: Stationarity test – Fixed Effects

This table shows the Phillips-Perron unit root test. The tests show that the variables are stationary at level 0.

	Phillips-Perron
R	S(0)***
ESG	S(0)***
SOC	S(0)***
GOV	S(0)***
ENV	S(0)***
TQ	S(0)***
RoA	S(0)***
LnTotA	S(0)***
LEV	S(0)***

Note: *** p<0.01, ** p<0.05, * p<0.1. S(*d*) is stationary at level d.

Table A6: Full Period – Primary

The table reports the estimates of the Primary regression from the periods 2002 through 2017. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 76918 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1A	2A	3A	4A	5A
ESG	0.000012				
	(0.000022)				
SOC		0.000022	0.000006		
		(0.000022)	(0.000019)		
GOV		-0.000048		-0.000044	
		(0.000033)		(0.000031)	
ENV		-0.000012			-0.000012
		(0.00002)			(0.000017)
TQ_{t-1}	-0.011745***	-0.011764***	-0.01175***	-0.011729***	-0.011741***
	(0.00084)	(0.000829)	(0.000833)	(0.000837)	(0.000836)
RoA_{t-1}	0.00072***	0.000728***	0.000725***	0.000728***	0.000725***
	(0.000095)	(0.000095)	(0.000095)	(0.000095)	(0.000095)
$LnTotA_{t-1}$	-0.036795***	-0.036609***	-0.036851***	-0.036512***	-0.036642***
	(0.002862)	(0.002912)	(0.002874)	(0.002913)	(0.002887)
LEV_{t-1}	0.000056	0.000057	0.000056	0.000057	0.000056
	(0.000040)	(0.000041)	(0.00004)	(0.000041)	(0.000041)
Observations	76918	76918	76918	76918	76918
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A7: Full Period – One-Year Lagged Primary

The table reports the One-Year Lagged Primary regressions estimates from the periods 2002 through 2017. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 82788 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1B	2B	3B	4B	5B
ESG_{t-12}	0.00				
	(0.000018)				
SOC_{t-12}		0.000005	-0.000009		
		(0.000021)	(0.000016)		
GOV_{t-12}		-0.000002		-0.000008	
		(0.000019)		(0.000016)	
ENV_{t-12}		-0.000023			-0.000021
		(0.000019)			(0.000016)
TQ_{t-1}	-0.008989***	-0.008996***	-0.008978***	-0.008966***	-0.008994***
	(0.000934)	(0.000932)	(0.000935)	(0.000935)	(0.00093)
RoA_{t-1}	0.000587***	0.000586***	0.000587***	0.000587***	0.000586***
	(0.000095)	(0.000095)	(0.000095)	(0.000095)	(0.000095)
$LnTotA_{t-1}$	-0.028253***	-0.028188***	-0.028178***	-0.028035***	-0.028199***
	(0.00266)	(0.002697)	(0.002643)	(0.002707)	(0.002618)
LEV_{t-1}	0.000047	0.000046	0.000047	0.000046	0.000046
	(0.000057)	(0.000056)	(0.000056)	(0.000056)	(0.000057)
Observations	82788	82788	82788	82788	82788
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A8: Full Period – Change Study

The table reports the Change Study regressions estimates from the periods 2002 through 2017. The only ESG variable that shows a significant effect on stock returns are ΔESG in 1C. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 87313 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1C	2C	3C	4C	5C
ΔESG	0.000122**				
	(0.000055)				
ΔSOC		0.000068	0.000047		
		(0.000079)	(0.000057)		
ΔGOV		0.000088		0.000060	
		(0.000076)		(0.000056)	
ΔENV		-0.000128			-0.000029
		(0.000087)			(0.000059)
TQ_{t-1}	-0.009116***	-0.009112***	-0.009114***	-0.009115***	-0.009112***
	(0.000988)	(0.000989)	(0.000989)	(0.000989)	(0.00099)
RoA_{t-1}	0.000692***	0.000692***	0.000692***	0.000692***	0.000692***
	(0.000092)	(0.000092)	(0.000092)	(0.000092)	(0.000092)
$LnTotA_{t-1}$	-0.025584***	-0.025567***	-0.025613***	-0.025600***	-0.025592***
	(0.002306)	(0.002307)	(0.002307)	(0.002306)	(0.002308)
LEV_{t-1}	0.000071	0.000071	0.000071	0.000071	0.000071
	(0.000047)	(0.000047)	(0.000047)	(0.000047)	(0.000047)
Observations	87313	87313	87313	87313	87313
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A9: Full Period – Lagged Change Study

The table reports the Lagged Change Study regressions estimates from the periods 2002 through 2017. The only ESG variable that shows a significant effect on stock returns are ΔGOV_{t-1} in 4D. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 86905 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1D	2D	3D	4D	5D
ΔESG_{t-1}	0.000011				
	(0.000050)				
ΔSOC_{t-1}		-0.000028	0.000039		
		(0.000069)	(0.000051)		
ΔGOV_{t-1}		0.000104		0.000090*	
		(0.000069)		(0.000053)	
ΔENV_{t-1}		0.000001			0.000049
		(0.000071)			(0.000054)
TQ_{t-1}	-0.008994***	-0.008993***	-0.008994***	-0.008993***	-0.008994***
	(0.00097)	(0.000969)	(0.00097)	(0.00097)	(0.00097)
RoA_{t-1}	0.000647***	0.000647***	0.000647***	0.000647***	0.000647***
	(0.000093)	(0.000093)	(0.000093)	(0.000093)	(0.000093)
$LnTotA_{t-1}$	-0.026175***	0.026173***	-0.026189***	0.026181***	-0.026200***
	(0.00235)	(0.002347)	(0.002349)	(0.002348)	(0.002349)
LEV_{t-1}	0.000065	0.000065	0.000065	0.000066	0.000065
	(0.00005)	(0.00005)	(0.00005)	(0.00005)	(0.00005)
Observations	86905	86905	86905	86905	86905
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
FirmFixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A10: Before the financial crisis – Primary

The table reports the estimates of the Primary regression from the periods 2002 through the end of July 2008. All of the control variables show a significant effect on stock returns. The regressions consist of 24972 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1A	2A	3A	4A	5A
ESG	0.000003				
	(0.000041)				
SOC		0.000045	0.000003		
		(0.000036)	(0.000025)		
GOV		-0.000018		-0.000028	
		(0.000047)		(0.000043)	
ENV		-0.000022			-0.000042
		(0.000032)			(0.000025)
TQ_{t-1}	-0.010088***	-0.019377***	-0.010100***	-0.010071***	-0.010031***
	(0.001356)	(0.001341)	(0.001367)	(0.001357)	(0.001352)
RoA_{t-1}	0.000972***	0.000823***	0.000971***	0.000978***	0.000993***
	(0.000195)	(0.000195)	(0.000196)	(0.000196)	(0.000198)
$LnTotA_{t-1}$	-0.017179***	-0.06073***	-0.017237***	-0.017091***	-0.016602***
	(0.002223)	(0.002346)	(0.002347)	(0.002249)	(0.002292)
LEV_{t-1}	-0.000125***	-0.000167***	-0.000125***	-0.000125***	-0.000120***
	(0.000053)	(0.000052)	(0.000053)	(0.000053)	(0.000052)
Observations	24972	24972	24972	24972	24972
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A11: Before the financial crisis – One-Year Lagged Primary

The table reports the One-Year Lagged Primary regressions estimates from the periods 2002 through the end of July 2008. The ESG variables that show a significant effect on stock returns are ESG_{t-12} in 1B, SOC_{t-12} in 2B, GOV_{t-12} in 4B and ENV_{t-12} in 5B. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 28811 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1B	2B	3B	4B	5B
ESG_{t-12}	-0.000106***				
	(0.000036)				
SOC_{t-12}		0.000064*	-0.000030		
		(0.000034)	(0.000024)		
GOV_{t-12}		-0.000054		-0.000098***	
		(0.000036)		(0.000025)	
ENV_{t-12}		-0.000028			-0.000059**
		(0.000034)			(0.000026)
TQ_{t-1}	-0.008508***	-0.017211***	-0.008707***	-0.008342***	-0.008689***
	(0.00095)	(0.00177)	(0.000973)	(0.000942)	(0.000952)
RoA_{t-1}	0.000459***	0.000516***	0.000441***	0.000474***	0.000452***
	(0.000151)	(0.000185)	(0.000151)	(0.000153)	(0.00015)
$LnTotA_{t-1}$	-0.020703***	-0.038668***	-0.021652***	-0.019532***	-0.021263***
	(0.002022)	(0.008516)	(0.002141)	(0.002055)	(0.002043)
LEV_{t-1}	-0.000017	-0.000041	-0.000014	-0.000027	-0.000013
	(0.000065)	(0.000155)	(0.000065)	(0.000065)	(0.000065)
Observations	28811	28811	28811	28811	28811
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A12: Before the financial crisis – Change Study

The table reports the Change Study regressions estimates from the periods 2002 through the end of July 2008. The only ESG variable that shows a significant effect on stock returns are ΔGOV in 2C. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 33336 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1C	2C	3C	4C	5C
ΔESG	0.000056				
	(0.000101)				
ΔSOC		-0.000058	-0.000067		
		(0.000095)	(0.000089)		
ΔGOV		0.000050*		-0.000034	
		(0.000086)		(0.000072)	
ΔENV		-0.000064			-0.000085
		(0.0001)			(0.000085)
TQ_{t-1}	-0.009343***	-0.016993***	-0.009341***	-0.009340***	-0.009339***
	(0.000938)	(0.001727)	(0.000938)	(0.000938)	(0.000938)***
RoA_{t-1}	0.000742***	0.00081***	0.000742***	0.000742***	0.000742***
	(0.00014)	(0.000151)	(0.00014)	(0.00014)	(0.00014)
$LnTotA_{t-1}$	-0.018624***	-0.03288***	-0.018625***	-0.018631***	-0.018617***
	(0.00148)	(0.007812)	(0.001479)	(0.001479)	(0.001481)
LEV_{t-1}	-0.000024	0.000102	-0.000024	-0.000024	-0.000024
	(0.000059)	(0.000118)	(0.000059)	(0.000059)	(0.000059)
Observations	33336	33336	33336	33336	33336
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A13: Before the financial crisis – Lagged Change Study

The table reports the Lagged Change Study regressions estimates from the periods 2002 through the end of July 2008. The ESG variable that shows a significant effect on stock returns are ΔGOV_{t-12} in 2D and 4D. All of the control variables except LEV_{t-1} shows a significant effect on stock returns. The regressions consist of 32928 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1D	2D	3D	4D	5D
ΔESG_{t-1}	0.000005				
	(0.000089)				
ΔSOC_{t-1}		-0.000054	0.000042		
		(0.000089)	(0.000078)		
ΔGOV_{t-1}		0.000161**		0.000132*	
		(0.000078)		(0.000073)	
ΔENV_{t-1}		0.00003			0.000074
		(0.000097)			(0.000081)
TQ_{t-1}	-0.009017***	-0.016771***	-0.009016***	-0.009008***	-0.009014***
	(0.000924)	(0.001708)	(0.000924)	(0.000924)	(0.000924)
RoA_{t-1}	0.000665***	0.000726***	0.000665***	0.000664***	0.000664***
	(0.00014)	(0.000156)	(0.00014)	(0.00014)	(0.00014)
$LnTotA_{t-1}$	-0.019034***	-0.033499***	-0.019036***	-0.019014***	-0.019042***
	(0.001535)	(0.007844)	(0.001536)	(0.001534)	(0.001535)
LEV_{t-1}	-0.000024	0.000085	-0.000024	-0.000024	-0.000024
	(0.000061)	(0.000121)	(0.000061)	(0.000061)	(0.000061)
Observations	32928	32928	32928	32928	32928
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A14: After the financial crisis – Primary

The table reports the estimates of the Primary regression from the periods April 2009 through 2017. The ESG variables that show a significant effect on stock returns are SOC, GOV and ENV in 2A, GOV in 4A and ENV in 5A. All of the control variables show a significant effect on stock returns. The regressions consist of 48566 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1A	2A	3A	4A	5A
ESG	-0.000019				
	(0.000032)				
SOC		0.000093*	-0.000018		
		(0.000054)	(0.000045)		
GOV		-0.000131**		-0.000160***	
		(0.000056)		(0.000053)	
ENV		-0.000159***			-0.000149***
		(0.000055)			(0.000046)
TQ_{t-1}	-0.011616***	-0.011693***	-0.011606***	-0.011632***	-0.011636***
	(0.001196)	(0.00119)	(0.001196)	(0.001189)	(0.001198)
RoA_{t-1}	0.000628***	0.000641***	0.000625***	0.000640***	0.000634***
	(0.000109)	(0.000107)	(0.000108)	(0.000108)	(0.000107)
$LnTotA_{t-1}$	-0.024961***	-0.022826***	-0.024751***	-0.023540***	-0.022992***
	(0.003854)	(0.003969)	(0.003858)	(0.003899)	(0.003984)
LEV_{t-1}	0.000270***	0.000271***	0.000270***	0.000269***	0.000270***
	(0.000062)	(0.000061)	(0.000062)	(0.000061)	(0.000061)
Observations	48566	48566	48566	48566	48566
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A15: After the financial crisis – One-Year Lagged Primary

The table reports the One-Year Lagged Primary regressions estimates from the periods April 2009 through 2017. The ESG variable that shows a significant effect on stock returns are ENV_{t-12} in 2B and 5B. All of the control variables show a significant effect on stock returns. The regressions consist of 50363 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1B	2B	3B	4B	5B
ESG_{t-12}	0.000015				
	(0.000030)				
SOC_{t-12}		0.000035	-0.000023		
		(0.000051)	(0.000039)		
GOV_{t-12}		0.000016		-0.000016	
		(0.00005)		(0.000045)	
ENV_{t-12}		-0.000117**			-0.000097**
		(0.000049)			(0.00004)
TQ_{t-1}	-0.009718***	-0.009732***	-0.009680***	-0.009671***	-0.009687***
	(0.00108)	(0.001086)	(0.001085)	(0.001081)	(0.001085)
RoA_{t-1}	0.000564***	0.000568***	0.000565***	0.000566***	0.000567***
	(0.000105)	(0.000105)	(0.000105)	(0.000105)	(0.000105)
$LnTotA_{t-1}$	-0.020044***	-0.019132***	-0.019546***	-0.019504***	-0.018596***
	(0.003964)	(0.004145)	(0.003929)	(0.004151)	(0.004045)
LEV_{t-1}	0.000233***	0.000235***	0.000232***	0.000230***	0.000233***
	(0.000057)	(0.000057)	(0.000057)	(0.000057)	(0.000057)
Observations	50363	50363	50363	50363	50363
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A16: After the financial crisis – Change Study

The table reports the Change Study regressions estimates from the periods April 2009 through 2017. All of the control variables show a significant effect on stock returns. The regressions consist of 50363 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1C	2C	3C	4C	5C
ΔESG	0.000060				
	(0.000065)				
ΔSOC		0.000172	0.000056		
		(0.00013)	(0.000077)		
ΔGOV		-0.000065		-0.000009	
		(0.000121)		(0.000075)	
ΔENV		-0.000089			-0.000009
		(0.00013)			(0.000077)
TQ_{t-1}	-0.009697***	-0.009697***	-0.009696***	-0.009696***	-0.009696***
	(0.001085)	(0.001087)	(0.0010856)	(0.001086)	(0.001086)
RoA_{t-1}	0.000566***	0.000567***	0.000566***	0.000566***	0.000566***
	(0.000105)	(0.000105)	(0.000105)	(0.000105)	(0.000105)
$LnTotA_{t-1}$	-0.019829***	-0.019829***	-0.019850***	-0.019856***	-0.019854***
	(0.003937)	(0.003939)	(0.003938)	(0.003938)	(0.003936)
LEV_{t-1}	0.000232***	0.000232***	0.000232***	0.000232***	0.000232***
	(0.000057)	(0.000057)	(0.000057)	(0.000057)	(0.000057)
Observations	50363	50363	50363	50363	50363
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A17: After the financial crisis – Lagged Change Study

The table reports the Change Study regressions estimates from the periods April 2009 through 2017. All of the control variables show a significant effect on stock returns. The regressions consist of 50363 observations, and all of the models have Time Fixed Effects, Firm Fixed Effects, and Robust standard errors.

	1D	2D	3D	4D	5D
ΔESG_{t-1}	-0.000044				
	(0.000058)				
ΔSOC_{t-1}		-0.000009	-0.000022		
		(0.000105)	(0.000067)		
ΔGOV_{t-1}		-0.000077		-0.000043	
		(0.000104)		(0.000068)	
ΔENV_{t-1}		0.000058			-0.000005
		(0.000103)			(0.000064)
TQ_{t-1}	-0.009698***	-0.009698***	-0.009697***	-0.009698***	-0.009696***
	(0.001087)	(0.001087)	(0.001087)	(0.001087)	(0.001086)
RoA_{t-1}	0.000566***	0.000565***	0.000566***	0.000566***	0.000566***
	(0.000105)	(0.000105)	(0.000105)	(0.000105)	(0.000105)
$LnTotA_{t-1}$	-0.019862***	-0.019868***	-0.019853***	-0.019850***	-0.019853***
	(0.003938)	(0.003939)	(0.003937)	(0.003938)	(0.003937)
LEV_{t-1}	0.000232***	0.000232***	0.000232***	0.000231***	0.000232***
	(0.000057)	(0.000057)	(0.000057)	(0.000057)	(0.000057)
Observations	50363	50363	50363	50363	50363
Time Fixed Effect	Yes	Yes	Yes	Yes	Yes
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes
Robust standard errors	Yes	Yes	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table A18: Diagnostics – Portfolio

The table shows the test scores for the Breusch-Pagan test (Heteroskedasticity), Durbin-Watson test (Serial correlation), and Breusch-Godfrey test (Serial correlation). The results show that HMLESG do not have problem with heteroskedasticity and serial correlation. The other portfolios have problems with heteroskedasticity but not with serial correlation.

	Breusch-Pagan	Durbin-Watson	Breusch-Godfrey
HMLESG	3.8702	1.927	0.15308
HESG	50.051***	1.6865**	0.91466
MESG	37.185***	1.839	0.030681
LESG	45.358***	1.6777**	1.927

Note: *** p<0.01, ** p<0.05, * p<0.1.

Table A19: Stationarity test – Portfolio

The table shows the Augmented Dickey-Fuller and Phillips-Perron unit root test. Both of the tests show that all the variables are stationary at level 0.

	Augmented Dickey-Fuller	Phillips-Persson
HMLESG	S(0)***	S(0)***
HESG	S(0)***	S(0)***
MESG	S(0)***	S(0)***
LESG	S(0)***	S(0)***
$R_m - R_f$	S(0)***	S(0)***
SMB	S(0)***	S(0)***
HML	S(0)***	S(0)***
RMW	S(0)***	S(0)***
CMA	S(0)***	S(0)***

Note: *** p<0.01, ** p<0.05, * p<0.1. S(*d*) stands for the stationary at level d.

Table A20: Correlation Matrix – Portfolio
The table shows that all of the variables show no problems with multicollinearity.

	$R_m - R_f$	SMB	HML	RMW	CMA
$R_m - R_f$	1	0.42	0.28	-0.49	0.03
SMB	0.42	1	0.29	-0.44	0.19
HML	0.28	0.29	1	-0.18	0.47
RMW	-0.49	-0.44	-0.18	1	-0.17
CMA	0.03	0.19	0.47	-0.17	1

Table A21: Variance inflation factor test – Portfolio
The table shows that all of the variables show no problems with multicollinearity.

	$R_m - R_f$	SMB	HML	RMW	CMA
$R_m - R_f$	-	1.32	1.35	1.26	1.29
SMB	1.43	-	1.41	1.36	1.34
HML	1.42	1.37	-	1.47	1.06
RMW	1.29	1.28	1.43	-	1.32
CMA	1.45	1.38	1.13	1.45	-

Table A22: Full Period – Portfolio

The table reports the Portfolio regressions estimates from the periods 2002 through 2017. HMLESG shows significance for SMB, HML, and CMA. HESG portfolio shows significance for α, $R_m - R_f$ and RMW. MESG portfolio shows significance for all variables. LESG portfolio shows significance for $R_m - R_f$, SMB, and CMA. The table also reports the individual Sharpe ratio for each portfolio, R^2 and Adjusted R^2. The regressions consist of 180 observations, and HMLESG is the only regression that does not have Robust standard errors.

	HMLESG	HESG	MESG	LESG
α	-0.0015	-0.0022**	-0.0029**	-0.0007
	(0.0011)	(0.001)	(0.0012)	(0.0017)
$R_m - R_f$	-0.0353	1.0066***	1.0784***	1.042***
	(0.0327)	(0.0416)	(0.04918)	(0.0735)
SMB	-0.2531***	0.0181	0.178***	0.2712***
	(0.0523)	(0.0348)	(0.0508)	(0.0681)
HML	-0.1226**	0.0186	0.1311***	0.1412
	(0.0512)	(0.0379)	(0.0485)	(0.0872)
RMW	0.0307	0.1296**	0.1527*	0.0989
	(0.0729)	(0.0577)	(0.0839)	(0.1255)
CMA	0.3577***	-0.021	-0.1819**	-0.3867**
	(0.0864)	(0.0688)	(0.082)	(0.1586)
Sharpe ratio	-0.457	0.542	0.498	0.614
Observations	180	180	180	180
R^2	0.265	0.93	0.9263	0.8639
Adjusted R^2	0.244	0.928	0.9242	0.86
Robust standard errors	No	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A23: Before the financial crisis – Portfolio

The table reports the Portfolio regressions estimates from the periods 2002 through June 2008. HMLESG only shows significance for SMB. HESG only shows significance for $R_m - R_f$. MESG only shows significance for $R_m - R_f$. LESG only shows significance for $R_m - R_f$. The table also reports the individual Sharpe ratio for each portfolio, R^2 and Adjusted R^2. The regressions consist of 67 observations, and HMLESG is the only regression that does not have Robust standard errors.

	HMLESG	HESG	MESG	LESG
α	0.0009	0.0019	-0.0011	0.001
	(0.0016)	(0.0019)	(0.0025)	(0.0031)
$R_m - R_f$	0.0542	0.7867***	0.8889***	0.8409***
	(0.0686)	(0.1109)	(0.157)	(0.1556)
SMB	-0.1802**	0.0785	0.218	0.2587
	(0.0828)	(0.1192)	(0.174)	(0.1584)
HML	-0.0554	-0.2301	-0.0077	-0.1748
	(0.0966)	(0.1551)	(0.1995)	(0.194)
RMW	-0.1115	0.0895	0.1281	0.2011
	(0.1356)	(0.1913)	(0.2638)	(0.265)
CMA	0.2181	0.0893	-0.2961	-0.1288
	(0.157)	(0.1694)	(0.2453)	(0.2244)
Sharpe ratio	-0.099	0.819	0.566	0.737
Observations	67	67	67	67
R^2	0.1369	0.7889	0.7575	0.6701
Adjusted R^2	0.0662	0.7716	0.7376	0.6431
Robust standard errors	No	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table A24: After the financial crisis – Portfolio

The table reports the Portfolio regressions estimates from the periods April 2009 through 2017. HMLESG shows significance for α, SMB, and CMA. HESG shows significance for α, $R_m - R_f$ and RMW. MESG shows significance for α, $R_m - R_f$ and SMB. LESG shows significance for $R_m - R_f$ and SMB. The table also reports the individual Sharpe ratio for each portfolio, R^2 and Adjusted R^2. The regressions consist of 105 observations, and HMLESG is the only regression that does not have Robust standard errors.

	HMLESG	HESG	MESG	LESG
α	-0.0049***	-0.0028***	-0.0021**	0.0021
	(0.0014)	(0.0007)	(0.0008)	(0.0013)
$R_m - R_f$	0.0184	0.9979***	1.0549***	0.9795***
	(0.0396)	(0.0195)	(0.0272)	(0.0458)
SMB	-0.2812***	-0.0052	0.1593***	0.2761***
	(0.0609)	(0.0324)	(0.0577)	(0.0966)
HML	-0.0227	0.006	0.0898	0.0287
	(0.0745)	(0.0439)	(0.0806)	(0.1353)
RMW	0.1137	0.1401**	0.0469	0.0264
	(0.092)	(0.0612)	(0.0886)	(0.1495)
CMA	0.197*	0.0681	0.0313	-0.1288
	(0.1183)	(0.0697)	(0.1087)	(0.1708)
Sharpe ratio	-1.125	1.086	1.092	1.376
Observations	105	105	105	105
R^2	0.2613	0.9711	0.9681	0.9087
Adjusted R^2	0.224	0.9696	0.9665	0.9041
Robust standard errors	No	Yes	Yes	Yes

Note: Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.