ESG Factors: How Are Stock Returns, Operating Performance, and Firm Value Impacted?

Joseph Falzon[*] and Reana Micallef[**]

University of Malta, Department of Banking & Finance, Malta.

Abstract: This study evaluates the relationship between an aggregate score for environmental, social, and governance indicators and financial performance for US firms. The study uses publicly listed firms on the S&P Mid Cap 400, S&P 500, and the S&P Small Cap 600 Index. To accomplish the empirical analysis of this dissertation, two methods are used; the Fama & French portfolio formation method and a panel regression of operating performance (ROA) and firm value (Q) against ESG.

The stock return analysis using Fama and French methodology is implemented by forming portfolios of firms with robust ESG scores and lower ESG scores using the top 10% of the S&P 1500 and the lowest 10% of companies. We find a negative alpha for both portfolios, which is less negative for the High ESG portfolio, displaying a link between ESG and CFP. The operating/firm value analysis uses annual data from 2010 – 2016 for 1,371 companies. ROA and Tobin's Q (dependent variables) are regressed on ESG, controlling for firm size and sales growth. A weak positive relationship is discovered between ROA, Q, and ESG.

An agreement on the effect of sustainability factors on performance has not been established in the existing literature. Some studies indicate a positive link between sustainability factors. Alternate studies show an inverse connection. Still, various studies have unclear results or are absent from statistical influence. Consequently, this creates opportunities for further investigation on the subject.

Keywords: Corporate Financial Performance, ESG score, Fama & French, Stock Returns, Sustainability.

INTRODUCTION

The focus on sustainability has boomed over the last few years. Some claim that sustainability has been the most important trend in the financial markets (Clark, G. L., Feiner, A. and Viehs M. (2015).

Environmental, Social and Governance (ESG) is integral to the Socially Responsible Investing (SRI) discipline. These extra-financial aspects might substantially impact an entity's value or corporate performance. ESG is vital to all stakeholders since it offers a way to measure a firm's capacity to be sustainable.

The authors' review of available academic research on ESG shows that companies that follow sustainability principles exhibit better and more stable financial performance. More broadly, an examination of over 2,000 studies of firm behavior determined a positive relationship between corporate financial performance and sustainability credentials as these firms beat competitors in both share prices and financial results.

ESG analysis can consequently be a path to recognizing businesses with strong growth projections, effective cost management, and the correct attributes to conquer brand loyalty from a progressively challenging community (Eisinger, 2018).

Conversely, several studies have revealed undesirable associations between financial and sustainable company performance. For example, as cited in Dufwa & Hammarstrom (2015), an empirical analysis of American firms conducted by Hart and Ahuja (1996) investigates the effect of ESG on numerous financial company performance ratios and discovers that there is a consequence in the short run on companies exercising ESG actions.

The main scope of this thesis is to determine if sustainability, as presented by the ESG factors, is a good investment tool in the US equity market and consequently influences the returns of American stocks. Existing literature on the topic has been revisited, and an empirical study on a robust sample of listed US stocks has been undertaken. Although many studies find mixed results about the impact of sustainability factors on return, certain studies found an association, as previously mentioned. For example, in two studies conducted in 2006 and a few years later in 2012 by Barnett and Salomon, a curvilinear relationship is discovered between financial performance and social responsibility. Kempf and Osthoff (2007) similarly find a curved connection, implying that outstanding and bad stocks outdo stocks in the middle.

Value can be added if investors consider ESG issues during the investment process. At a company level, ESG analysis

*Address correspondence to this author at University of Malta, Department of Banking & Finance, Malta; Email: joseph.falzon@um.edu.mt
**contribute equally

can increase securities analysis, as it requires a greater understanding of a company's operations.

The purpose of this study is to complement prior studies which relate ESG performance to corporate financial performance (CFP). The predominant questions are whether socially responsible firms are creating or eliminating value through ESG indications and how their operating performance is impacted. In addition, the authors shall determine if sustainability, as presented by the ESG factors, is a good investment tool in the US equity market and consequently influences the returns of American stocks.

RESEARCH QUESTION

Few studies emphasize a company's ESG disclosure and, consequently, its transparency. Therefore, this analysis is founded on data connected to the extent of ESG disclosure instead of ESG issues. Thus, the impact of US-listed firms' ESG transparency on performance is examined.

More precisely, the following research question has been chosen:

Does following an ESG disclosure score investment model bring higher stock returns, and result in better operating performance and firm value?

Therefore, the main question in this study is whether the market values ESG factors appropriately, as this is one of the most significant difficulties for stockholders considering ESG. This research will test the possible input of investing in the stocks issued by companies with strong corporate social responsibility scores on environmental, social, and governance indicators.

LITERATURE REVIEW

How ESG principles affect corporate financial performance (CFP) has greatly interested academics and practitioners since the early 1970s. Nevertheless, one of the fundamental problems has been to define a good understanding of the association between ESG and CFP. Indeed, certain studies have weakened confidence, which has concluded that integrating ESG in the investment process has brought unclear, inconsistent, or inconclusive results.

ESG & FINANCIAL PERFORMANCE: POSITIVE OR NEGATIVE RELATIONSHIP?

Numerous studies propose that measures of responsibility that encompass market risk factors yield superior returns. Other studies point out that businesses taking part in responsibility matters are 'safer' than businesses that do not engage in these problems, and therefore, these companies profit eventually. Others find that the 'extreme' cases yield abnormally high returns. Generally, it has been noted that many of the studies lack statistical significance. Since many agencies focus on the rating and analyzing companies based on sustainability factors, there will be a steadier ground for conducting empirical studies within the field of responsible investing as the data amount rises. Nevertheless, the impartiality and quality of agency ratings could be a concern (Albrecht, 2015).

For instance, in 2009, Godfrey, Merrill, and Hansen claimed that investing in ESG can be viewed as a safeguard against the company's reputation risks. Scandals concerning Hennes & Mauritz, Rabobank, and British Petroleum indicate the worth of investing in these factors. Investing in CSR provides insurance for reputation risks and can contribute to the enhancement of the name of an entity. McWilliams and Siegel (2006) state that a positive reputation has positive economic value. The authors claim that customers consider the services of firms with a good name (reputation) high quality. An additional advantage brought about by a good reputation is that it improves stakeholders' commitment (Godfrey 2005; Wang, Choi, and Li 2008). Service providers and suppliers are more likely to provide efficient services and perform in favor of the company. This heightened backing from investors can result in capital growth and generate more eagerness to provide resources to a company (Rindova and Fombrun,1991). A confident reputation boosts employee satisfaction and the enthusiasm to work for the institution and be loyal to the same firm. Edams (2011) discovers that corporate financial performance is affected positively by employee satisfaction. With a positive impact, Edams also realizes that it is likely to produce an optimistic alpha founded on employee satisfaction since he has found that markets cannot value this intangible properly. On the side of negative and positive theories, several studies offer clarifications for the more varied results found in the relationship between CSR and corporate financial performance. Weber (2008) presents a view closely linked to the discounted cash flow procedure. She claims that doing good deeds is profitable if the financial profits surpass financial expenses. The overall value of being moral is evaluated by discounting the added cash flows.

A theory was presented by Horváthová (2010), which specifies an inverted 'U'-relationship between CSR and financial performance. The circumstance creates this inverted relationship that investing in CSR will only result in an added value if the worth of a company is not already exploited. Alternatively, a theory concerning the recent mixed results found in the literature is based on the 'learning hypotheses. This theory suggests that the likelihood of producing alpha with ESG factors becomes more challenging once the market considers it. Because of this, the market corrects existing price levels.

Kempf and Osthoff (2007) criticize prior studies using funds rather than companies in their performance analysis as it is impossible to differentiate alpha connected to portfolio management skills from alpha associated with a responsibility investment style, thus distorting the outcomes. The writers study a great sample of US equities between 1992 and 2004. Their findings indicate that investors can increase risk-adjusted return by following a long-short approach that buys equities with strong sustainability ratings and sells stocks with low sustainability ratings. They also discover that the screening method used matters: applying a positive or best-in-class screening approach brings the highest outperformance (alpha). Furthermore, stocks with extreme ranking do better than stocks with in-between ranking, backing up the curvilinear connection exposed by Barnett and Salomon.

Friede, G., Lewis, M., Bassen, A., and Busch, T. (2015) show that a substantial number of studies specify an encouraging association between corporate financial performance and ESG. However, though the link is positive for a significant part, the diversity of relationships found in recent studies specifies that the connection between ESG and corporate financial performance is unreliable. Moreover, the lack of agreement and the unknown moderating factors make it challenging to assume the effect of ESG on corporate financial performance.

In Breuer and Nau (2014), we see an original contribution to studying the connection between ESG and CFP in the US technology sector. Breuer and Nau analyzed data between 2009 and 2012. A positive relationship between ESG performance and financial performance is found using Tobin's Q and Return on Assets (ROA) as firm value and operating performance, respectively. Moreover, the authors demonstrate that the outcomes have distinct implications under the standpoint being considered.

Busch & Friede (2018) investigate the relationship between corporate financial performance (CFP) and corporate social/environmental performance (CSP). Their findings show a strong, favorable, robust, and bilateral CSP-CFP relationship. Whether businesses prioritize ecological or social factors, the relationship is good, however corporate reputation emerges as a significant factor in CSP. They discover a particularly potent CSP-CFP relationship for operational CFP and come to the unassailable conclusion that being a good firm makes good financial sense based on the pool of existing literature.

Using the moderating effect of green innovation, Chouaibi & Chouaibi (2021), investigate the possible impact of incorporating social and ethical practices into strategy on the market valuation of environmental, social, and governance (ESG) enterprises.

The market value of enterprises is shown to be significantly positively correlated with societal and ethical activities. The empirical findings show that societal and ethical strengths combined with the moderating impact of green innovation increase business value, whereas deficiencies do the opposite. The outcomes from the data set's dynamic dimension show that there is consistency in firm values across time.

Although many studies have shown a positive relation, some research provides negative relationships between financial and sustainable firm performance. An empirical survey of American firms undertaken by Hart and Ahuja (1996) suggests that from an accounting perspective, there is a temporary consequence for companies exercising ESG actions. Cordeiro and Sarkis (1997) conducted a study that selected 530 US companies and showed a negative yet significant relationship between environmental pro-activism and security analyst one- and five-year earnings performance estimates. In the early 2000s, Sarkis and Cordeiro (2001) also studied around 480 US companies that either supported a pro-active stance by employing ESG in their methods or emphasized 'end-of-pipe' solutions that depend on external recycling and waste recovery. The authors found negative relationships between ESG and firm performance in both methods.

The effect of ESG (economic, environmental, social, and corporate governance performance) on the financial performance of UK enterprises is the subject of a study conducted by Ahmad, Mobarek, and Roni in 2021. The study uses static and dynamic panel data approaches to assess the effects of total ESG and specific ESG dimensions on corporate financial performance. It also evaluates the effects of high and low ESG on company financial performance. ESG has a favorable and considerable impact on the financial success of firms, according to the results of the overall ESG performance. The outcomes are contradictory in the case of the performance of any particular ESG, though. Overall, the findings support the assertion that high ESG enterprises outperform low ESG firms financially.

An overall conclusion can be drawn that there is a positive relationship between sustainability and operational performance (Fulton, M., Kahn, B. M., & Sharples, C. 2012, Hoepner and McMillian 2009, Salzmann 2005). Furthermore, despite an unclear link between ESG and CFP, there seems to be an upsurge in the number of studies finding a positive association between ESG performance and financial performance in recent literature. For example, Eccles R.G, Ioannou I. & Serafeim G. (2014) find that corporations with "high" sustainability outdo companies with "low" sustainability in the US in terms of both stock market and operational performance.

The theory produces contradictory forecasts on the profitability of ESG, as revealed by the different empirical results found in past research. Yet, prior literature suggests that good operating performance should render superior firm value. Furthermore, in the literature relating to corporate governance, it has been argued that good governance amplifies investors' confidence and trust, which results in a higher firm value (Bauer, Guenster & Otten, 2004). Empirically, studies also verify a positive relationship between corporate governance and value creation (Gompers, Ishii & Metrick, 2003) between environmental and social performance (Derwall, 2007; Sinkin, Wright & Burnett, 2008; Al-Najjar & Anfimiadou, 2012).

METHODOLOGY

The study tries to identify whether companies with higher ESG scores are presented with higher market returns, operating performance, and firm value.

Since the data uses an aggregate measure of ESG performance, based on the discussion in the earlier subsections, the hypothesis states that for US-listed companies:

H1: The higher the ESG disclosure score of an entity, the greater the abnormal returns.

H2: ESG disclosure scores are positively related to Operating performance as measured by ROA.

H3: ESG disclosure scores positively relate to Firm Value as measured by Tobin's Q.

These hypotheses lay the groundwork for this study and will be examined using the methodology defined below.

DATA ANALYSIS

The stock return analysis is constructed using three key data sets: book data, market data, and value data, as well as ESG data, used to create ESG sorted portfolios. Market timing data, book data, and value data are contingent on the timing used by Fama and French (1992). The accounting analysis uses ROA, Q, and ESG data as well as Sales growth and Firm size data.

There are numerous ESG score data providers for investors. For the scope of this analysis, we integrated ESG score data as provided by Bloomberg. ESG data on Bloomberg is collected through filings sourced by individual firms, including company websites, sustainability, CSR, annual reports, and a review done exclusively by Bloomberg.

The data selected was for 2016, as at the time of the study, it has been the most recent complete year containing an ESG score. The authors have sorted the S&P1500 companies based on their ESG score, highest to lowest, and then progressed to create two portfolios, each containing the top and lowest 10% companies.

For the accounting ratios analysis, the ESG score was not used as a sorting factor to create portfolios but instead was selected as the primary independent variable of interest.

REGRESSION EQUATIONS

This study uses both a time series method and a panel data method. In addition, all the regressions are run using the OLS estimation technique.

The dependent variable is built based on data from the Bloomberg terminal, while the independent variables were directly retrieved from Kenneth French's website for the stock return analysis. For the accounting ratios analysis, operating performance, and firm value (Dependent variables), measured by return on assets (ROA) and Tobin's q (Q) respectively, are regressed on ESG performance (independent variable) and control variables.

STOCK RETURN ANALYSIS

The authors form both equally weighted and value-weighted portfolios to explain likely variations of results contingent on different weighting practices. The portfolios are built using weekly stock prices for the top 10% and low 10% ESG sorted companies from 2016 to 2018. For the equal-weighted portfolio, the average weekly return of the portfolio is calculated as the average weekly return for all the stocks at the time. For the value-weighted portfolio, each firm's market capitalization is divided by the total market capitalization of the firms in the portfolio.

As independent variables, the authors have progressed with using the Fama & French three Factor model, which incorporates SMB, HML, and Market risk factors in addition to the risk-free rate.

Their three-factor model as applied to time series regression can be expressed as follows:

$$Ri - Rf = \alpha i + \gamma i(RM - Rf) + \gamma i SMB + \gamma i HML + \varepsilon i \qquad (A)$$

This model outlines that the portfolio's return over and above the risk-free rate ($Ri - Rf$) is dependent upon the sensitivity of the return to three factors, namely [i] the excess return on the market as defined by $RM - Rf$, [ii] the size factor (SMB), which is the difference between small stocks and significant stocks returns and [iii] the value factor (HML), which is the difference between high and low book-to-market stocks returns. The γi is the factor sensitivities as measured by the time series regression.

The analysis of Fama and French entails dividing the sample of securities into several portfolios built on the variables of interest, in this case, sorting by ESG.

For this study, the constant as represented by alpha (αi) should be more significant for the portfolio with higher ESG-rated companies than for the lower ESG-rated companies.

ACCOUNTING MEASURES ANALYSIS

Tobin's Q assesses how ESG can generate or terminate shareholder capital. Q is a progressive ratio computing a stock's value, presenting firm value (Derwall, 2007). Q is also selected as it is a good indicator that captures intangible assets, in this regard, ESG.

We will also use ROA to calculate the relation between ESG and operating performance, as ROA is one of the most comprehensive measures of the company operating performance (Derwall, 2007).

For this research, it is essential to capture ESG factors over a specific period. Thus, this secondary research utilizes ESG indicators as an independent variable.

This panel study spanning over seven years (2010-2016) and using yearly data for 1,371 companies, has 9,597 entries. These data points are reduced to 8,989 after eliminating missing data points due to being unavailable. The data for this analysis were retrieved from the Compustat database. The general equations are as follows:

$$ROA_{it} = \alpha_i + \beta_0 ESGscore_{it} + \gamma_{it} X_{it} + \varepsilon_{it} \qquad (B)$$

$$Q_{it} = \alpha_i + \beta_0 ESGscore_{it} + \gamma_{it} X_{it} + \varepsilon_{it} \qquad (C)$$

This model outlines that the operating performance (ROAit) and firm value (Qit) at time t for each cross-sectional unit i is dependent upon the overall ESG score and control variables (γitXit) varying over time t and across section i. εit represents an error term again fluctuating over time t and across section i.

ROA AND Q CONTROL VARIABLES

Size and risk are the most used control variables when researching CFP and financial performance (Waddock & Graves, 1997).

Dependent Variable – Tobin's Q

When regressing Q and ESG, the control variables used are firm size, sales growth, and ROA.

According to empirical findings, sales growth and firm size are anticipated to affect Q positively. In addition, prior studies find that controlling for the company's operating performance, ROA affects Q positively.

Dependent Variable - ROA

When regressing ROA and ESG, the control variables used are firm size, sales growth, and Q.

Size is significant as it has been recognized that small-scale firms do not display an equal level of CSR behavior as more prominent companies do. Therefore, we use the natural logarithm of total assets and annual sales growth to account for size.

PANEL DATA: FIXED EFFECTS & RANDOM EFFECTS

The fixed-effect model allows variables to change across entities but not over time, with the slope estimates fixed over time and cross-section. Using a fixed-effects model may supply a safeguard against omitted variable bias.

The random effect model recommends different intercept terms for each firm that are continuous over time. A Random-effects model is best suited when it is believed that no variables have been omitted from the regression or in the case that omitted variables would not be correlated with the explanatory variables used.

Two tests are conducted to identify whether a fixed or random-effects model best suits this study. First, the likelihood ratio test determines whether an OLS model or a panel data method is more appropriate. Subsequently, we apply the Hausman test.

PRE-REGRESSION ANALYSIS & RESULTS – FAMA & FRENCH METHOD

The penalties for the violation of the assumptions of the CLRM could result in achieving incorrect coefficient estimates and their associated standard errors. Nonetheless, the breach or relaxation of any premises does not necessarily imply that the data is erroneous.

NORMALITY TEST

The Jarque-Bera ("JB") test has been performed on the excess returns of the low ESG and high ESG portfolios for both value-weighted and equally weighted portfolios. Consistent with historical data, the null hypothesis of residual normality was rejected at all significance levels. Furthermore, all the data have positive excess kurtosis, implying leptokurtic distributions. The JB test was also performed on the Fama – French 3 factor model, whose result rejects the null hypothesis of normality.

AUTOCORRELATION

Two standard tests may be used to identify Serial Correlation. The Durbin-Watson ("DW") is a test for first-order autocorrelation, and the Breusch-Godfrey ("BG") test allows the examination of the relationship between several lagged values of the residual at the same time.

The null hypothesis of no autocorrelation between the residual and its immediate predecessor is rejected in both low and high ESG portfolios, and therefore there is positive autocorrelation.

HETEROSCEDASTICITY

When the residual variance of regression is constant, the errors are said to be homoscedastic. Without homoscedasticity, the OLS estimators will no longer have minimum variance. Therefore, in heteroscedasticity, the OLS will result in standard errors that are too big or too small. Thus, any inference made on the results could be misleading.

The White Test (1980) is one of the popular approaches to test whether the homoscedasticity assumption is met. The null hypothesis of homoscedasticity is tested against the alternate of heteroscedasticity.

In this research, the White Test is performed on all the models across time, and in most regressions, the results do not fail to reject the null hypothesis of constant variance in the residual. The null hypothesis was rejected in the low ESG model and dismissed only at the 10% confidence level for the High ESG portfolio. Results are presented in Appendix 1.

It is a well-known phenomenon that financial data tends to have non-constant variance, mainly due to the irrational behavior of investors.

UNIT ROOT TESTING AND STATIONARITY

The Augmented Dickey-Fuller ("ADF") is a standard test that checks for a unit root in a time series. The Kwiatkowski-Phillips-Schmidt-Shin ("KPSS") test complements the ADF tests; nevertheless, the null and alternative hypotheses are reversed.

The outcomes of the ADF test for the Low and High ESG excess returns imply that the null hypothesis of a unit root in the variables is rejected at all significance levels. The only exception of non-statistical significance in the ADF test was present in the excess returns of the equally weighted high ESG portfolio. The excess returns were subject to the KPSS test, which in almost all the cases, the results complemented the ADF tests. KPSS test statistics for [i] the equally weighted high and low ESG excess returns and [ii] the value-weighted low ESG excess returns were higher than the critical values at the 1% level. Therefore, in these instances, the authors did not reject the null hypothesis of a unit root.

In addition to the above, ADF and KPSS tests were also performed on the independent variables, namely, the Fama and French (1993) three-factor model for defined periods under analysis. All the variables across different periods were stationary at the 1%, 5%, or 10% confidence levels.

EMPIRICAL RESULTS

Stock Return Analysis: Fama-French 3 Factor Model

To certify that any overperformance in the portfolios is not the outcome of risk, the three Fama and French factors are controlled using equation (A):

$$R_{it} = \alpha + \beta_{MKT}MKT_t + \beta_{HML}HML_t + \beta_{SMB}SMB_t$$

Where Rit is the return on the Low/High ESG portfolio in year t over the risk-free rate, taken as the US one-month Treasury bill rate, from the Kenneth French webpage, α is an intercept that captures the abnormal risk-adjusted return. $MKTt$, $HMLt$, and $SMBt$ are the returns on the market, value, and size factors, extracted from the Kenneth French database using global data.

Table 1 below displays the principal findings from the analysis conducted for the entire 2016-2018 period. The low and high ESG sorted portfolios do not produce positive excess risk-adjusted returns but negative abnormal returns over both values weighted and equally weighted portfolios.

Table 1. Fama-French 3 Factor Regression – Value Weighted.

Panel A: Value Weighted Low ESG Portfolio	
α	-2.00***
	(0.0013)
βMKT	1.03***
	(0.0007)
βSMB	0.865***
	(0.0011)
βHML	0.071
	(0.001)
Panel B: Value Weighted High ESG Portfolio	
α	-1.95***
	(0.0012)
βMKT	1.02***
	(0.0007)
βSMB	-0.096
	(0.0011)
βHML	0.18*
	(0.001)

***significant at 1% level ** at 5% level * at 10% level.

Based on the results of the value-weighted portfolio, the two vital significant factors explaining returns are market and size for low ESG and market and value for high ESG; the coefficient for the market factor βMKT is 1.03 (for low ESG) and 1.02 (for high ESG), which shows that the portfolio returns track market returns very meticulously; the coefficient for the size factor, βSMB is 0.865, which shows that the portfolio is biased towards small-cap stocks, and a percentage of the underperformance is described by the smaller returns of large-cap stocks compared to small-cap. The value factor is insignificant for a Low ESG portfolio, so it fails to explain the portfolio returns. On the other hand, the HML factor is significant for the high ESG portfolio at the 10% level with a value of 0.18, implying we are looking at a growth portfolio.

Table 2. Fama-French 3 Factor Regression – Equal Weighted.

Panel C: Equal Weighted Low ESG Portfolio	
α	-2.09***
	(0.0012)
βMKT	1.03***
	(0.0007)
βSMB	1.04***
	(0.0011)
βHML	0.18*
	(0.001)
Panel D: Equal Weighted High ESG Portfolio	
α	-2.00***
	(0.0012)
βMKT	0.98***
	(0.0007)
βSMB	0.063
	(0.0011)
βHML	0.259***
	(0.001)

***significant at 1% level ** at 5% level * at 10% level.

The two substantial explanatory factors for the equal-weighted portfolio are market and value for high ESG, and for low ESG, all factors are significant at least at the 10% level; the coefficient for the market factor βMKT is 1.03 (for low ESG) and 0.98 (for high ESG), which specifies that the portfolio returns track market returns very accurately; the coefficient for the size factor, βSMB is 1.04 (for Low ESG) and insignificant for the High ESG portfolio, which shows that the portfolio is biased towards small-cap stocks. The lesser returns of small-cap stocks explain a portion of the underperformance compared to large-cap stocks. The HML factor is significant for both low and high ESG portfolios at the 10% level with values of 0.18 and 0.26, respectively, implying we are looking at growth portfolios.

The above negative alpha generated might be the result of an efficient market.

Although the alpha constant was negative for both low and high ESG portfolios, the negative value for the Low ESG portfolio was more significant than for the High ESG portfolio, implying the greater the ESG score of a company, the lower its negative returns. An investor can, therefore, still benefit from adding the ESG score of a company to his investment analysis process.

Table 3. ROA & Q Descriptive Statistics.

	2010	2011	2012	2013	2014	2015	2016
Return on Assets (ROA)							
Mean	0.12	0.13	0.12	0.12	0.12	0.11	0.11
Median	0.12	0.12	0.12	0.12	0.12	0.11	0.11
Standard Deviation	0.12	0.11	0.11	0.10	0.10	0.12	0.09
Kurtosis	31.87	20.91	11.13	7.49	12.09	22.26	5.09
Skewness	-0.12	-0.64	0.32	0.29	0.08	-2.02	1.09
Tobin's q (Q)							
Mean	1.19	1.10	1.16	1.43	1.38	1.30	1.35
Median	0.86	0.76	0.85	1.04	1.01	0.92	0.98
Standard Deviation	1.34	1.25	1.22	1.54	1.44	1.47	1.38
Kurtosis	25.35	19.38	11.48	10.99	14.15	30.67	12.82
Skewness	3.63	3.32	2.69	2.73	2.88	3.95	2.77

Operating Performance & Firm Value Analysis: ROA, Q & ESG

Descriptive Statistics

As previously mentioned, the secondary analysis takes on the relationship between accounting ratios ROA and Q with ESG. This sub-section investigates the descriptive statistics of the dependent variables to comprehend the sample's features better.

Observing the descriptive statistics above, for ROA, the mean and the median are constant over the seven years under examination. Less stable results are, however, presented by Q. The median is relatively steady, but the values for the mean fluctuate from one year to another. Standard deviation is stable for both dependent variables signifying most of the data points are close to the mean. The kurtosis values are higher than 3, indicating a leptokurtic sample. Concerning skewness, ROA shows a relatively symmetrical data set while Q presents high positively skewed data.

Fixed vs. Random Effect Model Testing

The Likelihood ratio fixed effect test is chosen first to identify whether an OLS model or Panel model is better suited for the study.

Table 4. Likelihood Test.

Redundant Fixed Effects Tests		
Test cross-section fixed effects		
	ROA	**Q**
Effects Test	Statistic	Statistic
Cross-section F	12.7329***	15.7422***
Cross-section Chi-square	10680.8168***	12048.2893***

***significant at 1% level ** at 5% level * at 10% level

The likelihood ratio test is statistically significant; therefore, we accept the alternative of a panel data approach. Following this confirmation, a Hausman test is performed to confirm whether a fixed effect or a random effect model is more suitable for the model.

Table 5. Hausman Test.

Correlated Random Effects - Hausman Test		
Test cross-section random effects		
	ROA	**Q**
Test Summary	Chi-Sq. Statistic	Chi-Sq. Statistic
Cross-section random	110.2738***	99.2014***

***significant at 1% level ** at 5% level * at 10% level

The Hausman Test displays that the fixed effect specification is more suitable. Therefore, for this analysis, we will evaluate Fixed effect regressions for cross-section and time.

ESG score & Operating Performance (ROA)

To assess how the collective ESG score and operating performance proxied by ROA are related, the authors run the regression (B) as specified in chapter 3. The exhibit below displays the analysis's empirical results under both a period and cross-section fixed effect.

Table 6. ESG & ROA Regression Results.

Independent Variable	**ROA**	**ROA**
Intercept	0.1209***	0.0942***
	(0.0174)	(0.0057)
ESG Score	-0.0008***	0.0012***
	(0.0002)	(0.0001)

Control Variables:		
Firm Size	-0.0024	-0.0055***
	(0.0022)	(0.0008)
Sales Growth	0.0003**	-0.0003
	(0.0002)	(0.0002)
Q	0.0266***	0.0355***
	(0.0010)	(0.0008)
Cross-Section Fixed Effects	Yes	No
Period Fixed Effects	No	Yes
N	8989	8989
R-squared	0.7700	0.2510
Adjusted R-squared	0.7286	0.2502
F-test	18.6288	300.8434
Prob (F-Test)	0.0000	0.0000

***significant at 1% level ** at 5% level * at 10% level.

Evaluating the results, under the period fixed effects approach, it is confirmed that Q positively affects ROA while firm size negatively affects ROA. The most significant determinants of ROA under the cross-section fixed effect approach are sales growth and Q, which affect ROA positively, as suggested by prior empirical findings.

When evaluating ESG performance, we can statistically observe the connection between ESG performance and ROA at the 1% level. However, the positive relationship is lost under the firm fixed effect approach as we find a significant adverse effect on ROA. Measurement errors in the ESG variables might be one explanation for this negative result.

Another explanation for the above negative result would revolve around the incorrect inclusion of firm fixed effects. The higher the ESG score of a firm, the higher its operating performance should apply to a population of firms and, therefore, exclude firm fixed effects. Time-fixed effects are, however, highly relevant as they describe a changing economic environment. Thus, caution should be exercised when making inferences from the above results.

ESG score & Firm Value (Q)

Consistent with the third hypothesis, equation (C) is run to test for the rapport between Q as a representation of company value and ESG performance.

Table 7. ESG & Q Regression Results.

Independent Variable	**Q**	**Q**
Intercept	1.8641***	2.7134***
	(0.1978)	(0.0653)
ESG Score	0.0084***	0.0177***
	(0.0020)	(0.0012)
Control Variables:		
Firm Size	-0.1426***	-0.2962***
	(0.0245)	(0.0087)
Sales Growth	-0.0004	0.0022
	(0.0018)	(0.0029)
ROA	3.4554***	5.3081***
	(0.1243)	(0.1163)
Cross-Section Fixed Effects	Yes	No
Period Fixed Effects	No	Yes
N	8989	8989
R-squared	0.822226	0.3324
Adjusted R-squared	0.790283	0.3317
F-test	25.7405	447.0539
Prob (F-Test)	0.0000	0.0000

***significant at 1% level ** at 5% level * at 10% level

Evaluating the results, under both period and firm fixed effects, it is confirmed that ROA and firm size affect Q positively (except for firm size under the firm fixed effect, which resulted in a negative relation to Q). These results meet a-priori expectations and fall in line with prior empirical findings.

When evaluating ESG performance, the ESG coefficient is positive under both fixed-effect models. This result comes to support hypothesis 2.

Results under the stock return analysis and the operating performance analysis provide contradicting results; however, this might not be the case. When ROA is positive, it might be the case that no alpha is generated. Let us take an example. If a firm implements specific changes to reflect an improvement in ESG, then better ESG would result in higher valuations. This would result in two outcomes. In a thoroughly efficient market, expected returns will be higher, and prices should immediately go up to reflect this added information meaning immediately higher actual returns. Thus, we will have higher expected and actual returns in the stock market. We should find zero alpha if there is no surprise in how expected returns are generated. Secondly, an impact on operational performance is also noted. Better governance will lead to either higher cash flows in the future or lower risk, leading to higher ROA. This is the case of having a higher ROA but no alpha.

In the above results, we have a situation under period fixed effects whereby ROA is positive, but alpha is negative under the stock return analysis. This situation would happen if the market predicted that better ESG would lead to a percentage improvement in cash flows in the future. Still, a lower percentage of progress, i.e., less than expected, is attained. That lower unit signifies that the market was overestimating the effects of changes in ESG when reflecting these changes in prices.

To conclude, an overall positive yet weak relation between ESG and accounting variables ROA and Q has been found in the US.

CONCLUSION

The affiliation between ESG performance and financial performance for companies in the United States has been investigated in this study through multiple regressions. The results from this study are significant both on an individual stock level and when combined to create portfolios based on ESG disclosure scores. An overall positive (weak) relationship has been identified, which is constant with prior empirical studies; however, a negative relationship is found between ROA and ESG. This shows that the connection is more multifaceted than it was first predicted, and future investigation into this pillar of CSR is required as this topic is of growing concern to investors.

The general conclusion, constructed on these results, suggests that ESG has a minor influence on financial performance, yet before rejecting a relationship, some added testing needs to be completed.

The stock return analysis results using the three Fama & French factors display a meaningful relationship between ESG and returns, which is statistically significant. Although the alpha constant was negative for both weak and robust ESG portfolios, the negative coefficient for the low ESG portfolio was more important than the High ESG portfolio, implying the more significant the negative returns, the lower the ESG disclosure of a company. This means an investor can still benefit from adding the ESG score of a company to his investment analysis process as the portfolio containing High ESG companies had an alpha that is less negative than the alternative portfolio.

The secondary analysis results show a positive connection between ESG and Tobin's Q under cross-section fixed and period fixed effects. The outcomes for ESG and ROA are, however, mixed. A positive relationship is found when controlling for period fixed effects, yet this positive connotation is not preserved when controlling fixed effects. Nevertheless, the reader should not take the results for ROA as ESG events having any constructive influence on a firm's operating performance. In contrast, the positive impacts obtained under period fixed effects do hold and contribute to improved financial output; nonetheless, the advantages do not compensate for the costs forced on the company from conducting such activities, at least not in the US and in short to medium term.

There have been quite a lot of studies covering the affiliation between ESG and financial performance in recent years. The selected methods of analysis aimed to establish a more explicit connection between ESG and financial performance. This research guides asset managers and the financial industry before and after an investment. ESG should not be considered solely as an investment strategy but to progress the company's corporate social responsibilities.

LIST OF ABBREVIATIONS

CFP	=	Corporate Financial Performance
CLRM	=	Classical Linear Regression Model
CSR	=	Corporate Social Responsibility
ESG	=	Environment, Social and Governance
GICS	=	Global Industry Classification Standard
OLS	=	Ordinary Least Squares
PRI	=	Principles for Responsible Investing
Q	=	Tobin's Q
R&D	=	Research and Development
RI	=	Responsible Investing
ROA	=	Return on Assets
SRI	=	Socially Responsible Investing
S&P 500	=	Standard and Poor's 500
US	=	United States

CONFLICT OF INTEREST

No sponsorship or funding arrangements for this research have been provided, and the authors have identified no possible conflicts of interest.

Appendix 1 – Heteroskedasticity Tests

Equally Weighted High ESG Portfolio

Heteroskedasticity Test: White			
F-statistic	2.477472	Prob.F (9,142)	0.0117
Obs *R-squared	20.62835	Prob. Chi-Square (9)	0.0144
Scaled explained SS	10.85574	Prob. Chi-Square (9)	0.2857

Equally Weighted Low ESG Portfolio

Heteroskedasticity Test: White			
F-statistic	4.105135	Prob.F (9,142)	0.0001
Obs *R-squared	31.38275	Prob. Chi-Square (9)	0.0003
Scaled explained SS	19.76366	Prob. Chi-Square (9)	0.0194

Value Weighted High ESG Portfolio

Heteroskedasticity Test: White			
F-statistic	1.723462	Prob.F (9,142)	0.0888
Obs *R-squared	14.96843	Prob. Chi-Square (9)	0..0918
Scaled explained SS	8.548662	Prob. Chi-Square (9)	0.4799

Value Weighted Low ESG Portfolio

Heteroskedasticity Test: White			
F-statistic	4.786332	Prob.F (9,142)	0.0000
Obs *R-squared	35.37826	Prob. Chi-Square (9)	0.0001
Scaled explained SS	25.81347	Prob. Chi-Square (9)	0.0022

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