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The effect of corporate social responsibility on corporate financial performance

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Abstract

We examine the relation between corporate social responsibility (CSR) and corporate financial performance (CFP), during the period of 2008-2018 for North American companies listed on the S&P500. We measure CFP by return on assets (ROA), return on invested capital (ROIC) and EBITDA-margin, controlling for size and industry effects. CSR and CFP appear to be related when using traditional OLS regression models, however the results differ with the measurement of CFP. The effect of CSR on CFP weakens when we perform more sophisticated methods such as the Anderson and Hsiao instrumental variable method. Additionally, we find initial evidence that financial performance influences CSR activities, indicating that firms who show strong financial results are more included to participate in CSR activities. All in all, if CSR activities provide benefits to the firms, then CSR activities are positively related to firm size and they appear to divulge themselves in forms unrelated to financial performance, given the impact of ESG scores are relatively small and have the tendency to provide spurious results.

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I. Introduction

"The area of corporate social responsibility (CSR) has become a notable topic both in the business and the academic press" (Nelling and Webb, 2008). According to research by Gadenne, Kennedy, and McKeiver (2009), there is growing interest in CSR among managers and executives, especially at small and medium sized companies. Along the same lines, Flammer (2012) found evidence suggesting that over time, the negative stock market reaction to eco-harmful behavior has increased, while the positive reaction to eco-friendly initiatives has increased, concluding that the environmental awareness among investors has increased over time. This paper will focus on the question whether it financially beneficial for companies to engage in these socially responsible business practices.

Over the past three decades, the question whether CSR influences corporate financial performance (CFP) has caught the attention of many researchers including Dorfleitner, Halbritter and Nguyen (2015), Hull and Rothenberg (2008) and Tsoutsoura, M. (2004), yet no consistent answer prevails. McWilliams, Siegel and Wright (2006), conducted a review study and summarized empirical studies relationship between CSR and CFP. The main outcomes of this review conclude that the literature until 2006 on CSR and its effect on CFP do not provide consistent results. Their findings also suggest that early research suffered from either inconsistency in the nature of the CSR events or it suffered inconsistency in the methodology that was used. Detailed information is summarized in table 1.

Interestingly, recent studies conducted by Tang, Eiríkur, and Rothenberg (2012) and by Ameer and Othman (2011) both raise attention to the problem that has plagued research for many years. Namely that some of the ambiguity surrounding the financial results of CSR may be related to variations in how CSR is defined and measured. Moreover Dhalruds (2006) argues that the interpretation and implementation of CSR can differ per region, country, industry and company. This partly explains why many studies post 2010 isolate one country or industry when looking at the relationship between CSR and CFP.

Thus far the introduction has shown that the fundamental relationship of CSR and CFP is not yet fully understood, and that existing research cannot provide consistent results. The problem which causes inconsistent results appears to be twofold. Firstly, existing research has been using various definitions of CSR and secondly, there is little consistency in the performance measurements used to define CFP. In this paper, I will explore the direction and magnitude of the relationship between CSP and CFP in the North American region from 2008 to 2018, measured by three financial performance measurements; Return on assets (ROA),

return on invested capital (ROIC) and the margin on earnings before interest, taxes depreciation and amortization (EBITDA-margin). This paper aims to empirically extend the existing CSR literature such as Ameer & Othman (2011) and Dhalruds (2006). Additionally, this paper will contribute to the limited literature on CSR activities that is available to date, regarding the North American region, across-industries. Resulting in the following research question:

Is there a positive relationship between financial performance and investment in sustainability initiatives and corporate social responsibility in the United-States of America for the period 2008-2018?

The remainder of this paper is built upon the following sections. Section II discusses the theoretical foundation supporting the research and it elaborates on the ongoing discussion regarding the definition and measurement of CSR and CFP. Section III explores the dataset and the variables that are employed. Section IV examines the research procedures and methodology used in this study. The results will be discussed in Section V and will be followed up by the conclusion, limitations and suggestions for future research all of which are clarified in Section VI.

II. Theoretical framework

A. Literature review

A.1. Defining CSR

In this section, we will provide a theoretical background of the various CSR definitions that are being used in practice, which will be useful in order to conceptualize CSR within the scope of this research. The definition of CSR has changed significantly since first the formal definition by Bowen (1953). However, it was not until 1970 that CSR was introduced by the Committee for Economic Development in the United States by means of a 'social contract' that exercised the idea that companies had an obligation to contribute to the society. By the 1980s, CSR continued to evolve as more organizations began incorporating social interests in their business practices whilst becoming more responsive to stakeholders as is mentioned by Thomasnet (2020). The 1990s marked the beginning of the widespread approval of CSR and only a decade later CSR became an essential strategy for many multinational companies such as Coca-Cola, Pfizer and Walt Disney.

The most used definition of CSR from 1980 to 2003 is "A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" Commission of the European Communities (2001) Dahlsrud (2006). Since 2014, the European Commission has defined CSR "as the responsibility of enterprises for their impact on society". Companies can become socially responsible by integrating social, environmental, ethical, consumer, and human rights concerns into their business strategy and operations". Both definitions define CSR in the following five dimensions:

- Environmental dimension
- Social dimension
- Stakeholder dimension
- Economic dimension
- Voluntariness dimension

"These dimensions enclose the different interpretations and directions used to describe corporate sustainability, including corporate governance, environmental management, brands reputation, customer loyalty, ethics and employee satisfaction" López, Garcia, and Rodriguez, (2007). Another widely used definition of CSR describes CSR in the following manner "actions that appear to further some social good, beyond the interests of the firm and that which is required by law" McWilliams and Siegel (2001). Within the scope of this paper, CSR will be defined along the five dimensions as described by the commission of the European communities whilst incorporating the extension of the voluntary basis defined by McWilliams and Siegel (2001).

A.2. Existing research

Thus far we have constructed the definition of CSR that will be used throughout this paper. The following section will expand upon the ongoing debate whether CSR is desirable and beneficial to companies, which we have briefly mentioned in the introduction. The rise of CSR has elevated new studies that investigate the relationship between CSR and CFP. Unfortunately, thus far the existing literature has produced mixed results. For example, the study by Klassen and Whybark (1999) suggest that there is a negative relationship between CSR and CFP, arguing that firms trying to enhance CSR draw resources and management effort away from core areas of the business, resulting in lower profits. Other studies reveal that there might be a positive relationship between CSR and CFP. For instance, Tang, Eiríkur, and

Rothenberg (2012), conclude that when engaging in CSR slowly and consistently, with a focus on related dimensions of CSR, CFP will be enhanced. Section B of the theoretical framework discusses the 'related dimensions of CSR' in further detail. Similarly, research by Ameer and Othman (2011) found that companies who emphasize on sustainability practices have better financial performances measured by ROA, profit before taxation and cashflow from operations, compared to those without such CSR commitments

One of the reasons for the mixed empirical results stems from the fact that CFP can be measured in two ways. The first being, an accounting-based measurement such as ROA, the second being, a market-based measurement such as earnings per share. Research by Hull and Rothenberg (2008), focusses on the accounting-based measurements, they argue that the relationship between CSP and CFP is positive, though complicated. "Previous studies in various environmental management domains have predicted that customer satisfaction, reputation, and competitive advantage are three outcomes of CSR" (Walsh and Beatty, 2007).

Although we observe that the relationship between CSP and CFP is not straightforward, we expect our findings to be similar to the research by Hull and Rothenberg (2008), which concludes that the overall relationship will be positive when using accounting-based performance measurements. Moreover, this paper will focus on the following three performance measurements: ROA, ROIC and EBITDA-margin. These measurements will be discussed in further detail in section B of the methodology. Taking prior research into consideration, the following hypotheses will investigate the following:

H1: Corporate social performance positively affects a corporate financial performance measured by ROA

H2: Corporate social performance positively affects a corporate financial performance measured by EBITDA margin

H3: Corporate social performance positively affects a corporate financial performance measured by ROIC

A.3. Measurement problem

As mentioned before, measuring the degree and effectiveness of CSR engagement has plagued researchers for the past decades. Over the years we have seen new measurements and

new weighting scales that aim to increase transparency and the effectiveness of measuring CSR engagements. The emergence of 'Environmental, social and governance points' often referred to as ESG points is the most notable step in the right direction, unfortunately it is not flawless.

A parallel could be drawn between credit ratings agencies and social and environmental rating agencies. For instance, credit agencies enhance transparency and efficiency in debt capital markets by reducing the information asymmetry between borrowers and lenders McDaniel (2002). Similarly, social and environmental rating agencies aim to improve transparency and efficiency to the extent that firms engage in socially responsible behaviour. These agencies use ESG scores to measure a company's behaviour. ESG ratings provided by specialized rating institutions play an important role in the decision-making process of managers and investors who care about social responsibility as well as for numerous studies Dorfleitner at al. (2015). For instance, mutual funds and indices rely on ESG ratings when selecting their optimal investment portfolio. Socially responsible (SR) investments are defined within a screening process. Generally, one can distinguish screening between a positive and a negative screening approach. The negative screening methods consist of scrutinizing companies for controversial business activities such as tobacco, gambling or weapons. On the other side, the positive screening process selects companies based on CSP measures referring to the assessment of CSR decisions Dorfleitner et al, (2015) Luo and Bhattacharya, (2009).

Extensive research reveals that there is an ongoing debate surrounding the validity of ESG measurements. Dorfleitner et all. (2015) conclude that ESG measurements fail to accurately forecast firms future CSR behaviour. On top of that, they argue that the above-mentioned rating providers fail to properly incorporate ESG measurements, methodology and CSR definition. On the other hand, Luo et all. (2009) and Semenova and Hassel (2014), suggest that the ESG dimensions and scores do converge, whilst arguing that each database has its pros and cons relative to each other. Results may differ depending on which database used, which makes it essential to select a database of which the methodology and the definition of CSR represents one's research topic the best.

III. Methodology

In this chapter, the methodology of this empirical research will be discussed. First, the datasets and the measurements of CSR and CFP are described. Afterwards, the regression models and the specification of the variables are discussed, and descriptive statistic will be shown. To evaluate the relationship between CSR and CFP a regression analysis is performed based on a

balanced panel dataset. “Panel data is defined as a data set constructed from repeated cross-sections over time. With a balanced panel, the same units appear in each time period. With an unbalanced panel, some units do not appear in each time period, often due to attrition” Wooldrige (2002).

A. Data

“Different proprietary databases have been used extensively in past research to assess the environmental performance and environmental risk of companies” (Semenova and Hassel 2014). Some of the most important ESG rating providers are ASSET4 by Thomson Reuters and DataStream/Eikon, MSCI ESG STATS (formerly known as Kinder, Lydenberg, and Domini Research & Analytics; KLD) and RobecoSAM (a merger between Robeco and Sustainability Asset Management Group). Similar to Waddock and Graves (1997), McWilliams and Siegel (2001), Tang et all, (2012) and many others, the financial data is retrieved from Compustat provided by the DataStream (2020) This dataset integrates financial and industry data covering 99% of the worlds’ total market capitalization, which includes the Standard & Poor’s 500 index (S&P 500) and it has been proven to be consistent and reliable over time. The S&P500 consists of the 500 biggest American firms measured by their market capitalization.

ESG scores are retrieved from the ASSET4 database provided by DataStream / Eikon. The data includes transparent ESG data and scores for over 6000 global companies with data since the financial year 2002. The database not only provides an individual ESG score per category, but it also provides a weighted Thomson Reuters ESG Score, weights and calculations can be found in table 2 below. The weighted ESG score will be used in the regression models and will represent to which degree a firm is engaged in CSR activities.

To keep a strongly balanced panel dataset, companies that had missing data in either the ESG scores or the financial data was removed from our dataset. After the removal, the dataset included 318 individual companies that were based in North American and listed on the S&P 500 from 2008 to 2018.

Table 2. Description of the weighted average ESG score

Pillar	Category	Indicators in rating	Weights
Environmental	Resource use	20	0.11
	Emissions	22	0.12

	Innovation	19	0.11
Social	Workforce	29	0.16
	Human Rights	8	0.045
	Community	14	0.08
	Product Responsibility	12	0.07
Governance	Management	34	0.19
	Shareholders	12	0.045
	CSR Strategy	8	0.045
Total		178	1

Note. The ESG Scores are calculated on based on the 178 data points listed in Glossary plus 2 analytic, available on Eikon

B. Model specification

To assess the relationship between CSR and CFP, we will assess this relationship utilizing multiple regression analysis, where CSR is measured in ESG scores and CFP will be measured using accounting performance measures. A least-squares regression is performed to examine the causal relationship between CSR and CFP. First, we will perform a random-effects model, to review the initial relationship between CSR and CFP. The Breusch and Pagan Lagrange multiplier test will be applied to the random effects model estimates to test whether Pooled OLS regression was the appropriate model to apply for analysis, as described by Breusch and Paga (1980).

As said before, this study uses a panel dataset of a large cross-section of firms several years, which is the reason why it is useful to perform a fixed effect regression approach to account for correlation in the error term. Given that the fixed-effects model will control for the unobservable characteristics in panel data that differ between firms but are constant over time. Additionally, we will run a Hausman test to test whether the preferred model is a random-effects model or the alternative fixed-effects model, as described by Hausman (1978).

Previous research by Nelling and Webb (2008), suggested that the companies which have strong financial performances are more inclined and more capable of allocating resources towards sustainable initiatives. The problem described by Nelling and Webb (2008), could cause a simultaneous bias. Simultaneity is where the explanatory variable is jointly determined with the dependent variable Wooldridge (2012). In other words, X causes Y, but Y also causes X. In order to investigate whether our dataset exhibits similar simultaneity, the ESG scores

will be regressed both as dependent and independent variable to the financial performances measures that are used. In case we find evidence of simultaneity, we will perform a two-staged-least-squares regression (2SLS), which is commonly used to deal with Simultaneity bias

Lastly, we will use a 2SLS dynamic panel model, including instrumental variables (IV) as described by Anderson and Hsiao (1982) to assess the relationship between CSR and CFP. This method aims to control for simultaneity equation bias and endogeneity. Anderson and Hsiao (AH) suggested the following two steps. Step one, take the first difference of the model to eliminate the μ_i and step two, use $\Delta y_{i,t-2} = (Y_{i,t-2}, -Y_{i,t-3})$, as an instrument for $\Delta y_{i,t-1} = \left(Y_{i,t-1} - Y_{i,t-2} \right)$.

We will use the following two models in the Anderson and Hsiao (IV) estimation. The first model being the fixed effects within model, when using this model, we transform the dynamic panel data model (2) into model (4). In this model, $\gamma_{i,t-2}$ is an invalid instrument since $\nu_{i,t-2}$ from the instrument is present in $\bar{\mu}_i$ from the error term. The second model will be the AH (IV) estimation of the first-differences, model (5). We will be using $\gamma_{i,t-2}$ as an instrument for $Y_{i,t-1} - Y_{i,t-2}$, which is an valid instrument since it is not correlated with $(\nu_{i,t} - \mu_{i,t-1})$, assuming that the errors $(\nu_{i,t} - \mu_{i,t-1})$ are to an extent not serially correlated. Model specifications can be found below.

(1) $\gamma_{it} = \alpha + \beta_{it} X_{it} + \varphi_s D_s + (\mu_i + \nu_{it})$

(2) $\gamma_{it} = \alpha + \delta_1 \gamma_{i,t-1} + \beta_{it} X_{it} + \varphi_s D_s + (\mu_i + \nu_{it})$

(3) $\gamma_{it} = (\alpha + \mu_i) + \beta_{it} X_{it} + \nu_{it}$

(4) $\gamma_{it} - \bar{\gamma}_i = (\gamma_{i,t-1} - \bar{\gamma}_t)\, \delta_{it} + (x_{i,t-1} - \bar{x}_t)\, \beta_{it} + \nu_{i,t} - \bar{\mu}_i$

(5) $\gamma_{it} - \gamma_{it-1} = \delta_{it}(\gamma_{i,t-1} - \gamma_{i,t-2}) + (x_{it} - x_{it-1})\, \beta_{it} + (\nu_{i,t} - \mu_{i,t-1})$

- γ_{it} is the dependent variable *i* at time *t.*
- X_{it} is the independent variable *i* at time *t.*
- D represent the dummy variable for SIC codes *s.*
- α intercept, the expected mean value γ when all $X_{it} = 0$.
- μ_i time-invariant part of the error term
- ν_{it} idiosyncratic part of the error term which varies by period and by time.

C. Regression variables

C.1. ROA

To assess the relationship between CSR and CFP, we use the accounting-based performance measure ROA. This measure seems appropriate as it represents the profitability of the firm with respect to the total set of resources, or assets, under its control. Finally, "ROA yields the most direct information about the results of the chosen allocation of those resources" Hull and Rothberg (2008).

C.2. EBITDA-margin

We will analyze the relationship between EBITDA-margin, this accounting-based measure is derived by subtracting the expenses from net earnings. "EBITDA has the ability to include CSR effects both on sales and expenses" Becker-Blease, Kean, Etebari, and Baumann (2010).

C.3. ROIC

We will measure the relationship between the ESG scores and ROIC. "The return on capital or invested capital measures the return earned on capital invested in an investment" Damodaran (2007). ROIC can be used as an accounting measure of profitability and it gives an insight into the firm's efficiency on investments. Brealey, Myers, and Allen (2010). ROIC is calculated using the following formula:

$$ROIC = \frac{NET\ OPERATING\ PROFIT\ AFTER\ TAX(NOPAT)}{INVESTED\ CAPITAL}$$

*Note: NOPAT= earnings before interest and tax * (1-tax rate)*

Invested Capital = Invested Capital = Fixed Assets + Current Assets – Current Liabilities – Cash

C.4. ESG score

ESG score represents the weighted average ESG score obtained from Datastream/ Eikon (2020), descriptions can be found in table 2 above.

D. Control variables

D.1. Size

Size is added because prior research by Nelling and Web (2008), Hull and Rothenberg (2008) and Waddock and Graves (1997) suggest that there is some evidence that larger firms engage in more CSR activities. Size can be measured in different ways, for example, the number of employees, the book value of total assets or the yearly total revenue. Similarly, to above-mentioned research, we will control for firm size by taking the total assets into account. Given the fact that our dataset solely contains companies that are listed on the S&P 500, we will also use market capitalization as a proxy of size. However, when looking at the descriptive statistics in table 4, we observe large variations in total assets and market capitalization. Furthermore, in table 5, we observe that the logarithmic variants of market capitalization and total assets generally have a higher significant correlation with the variables of interest than their base variants. For the reasons mentioned above the logarithm is used which neutralizes the influence of extremely large values.

D.2. Industry

Industry is added because of earlier research by Graves and Waddock (1994 and 1997), that showed differences in both financial performances as in the quality of CSR among different industries. We will be controlling for industry using the 4-digit Standard Industrial Classification (SIC) represented in the model by dummy variables. A summary of the distribution of each industry can be found in table 3. A dummy variable is one that takes the value of 0 or 1 to indicate the absence or presence of, in this case, some industrial effect that may be expected to shift the outcome.

Table 3. Industries in sample

Industry	SIC	N	Mean ESG	MIN ESG	MAX ESG
Mining, construction	100-1999	21	47.96	10.31	83.91
Food, textiles, apparel	2000-2390	20	61.10	9.14	89.63
Forest products, paper, publishing	2391-2780	20	66.12	26.54	89.29
Chemicals, pharmaceuticals	2781-2890	24	60.52	12.74	92.97

Manufacturing	2891-3990	62	57.02	6.77	95.07
Transportation	3991-4731	11	55.60	7.22	83.21
Telephone, utilities	4732-4991	30	55.85	15.74	89.46
Wholesale, retail	4992-5999	25	56.63	13.25	91.51
Bank, financial services, real estate	6000-6799	67	55.23	1.78	88.85
Services	7000-8999	38	49.08	10.02	93.19
Total		318			

Note: obtained from the United States department of labor.

Min: minimum, MAX; maximum.

D.3. Risk

As a proxy for the risk, we will be calculating the financial leverage for all the companies in our dataset. Financial leverage is calculated by dividing long-term debt by the total assets, formula can be found below. The long-term debt represents all the interest-bearing financial obligations, excluding amounts due within one year. Both long term debt and total assets are taken from the begin balance sheet of each year. This ratio has served as a proxy for risk in previous research, such as Tsoutsoura (2004) and Lopez et al. (2007).

(6) $Financial\ leverage = \frac{Total\ long-term\ tebt}{Total\ assets}$

E. Descriptive statistic

In Table 5, we report the correlation matrix for the sample of the firms used in this study. In particular, we are interested in the correlations between the ESG scores and multiple measures of CFP. In the first column of Table 5, we can see that the ESG scores are significantly and positively and correlated with CFP measured by ROA and ROIC at $p \leq 0.001$. On the other hand, the ESG score is negatively and significantly correlated with EBITDA-margin at $p \leq 0.001$. On top of that, the ESG scores are positively and significantly correlated with both control variables for size at $p \leq 0.001$. The final control variable, financial leverage, is not significantly correlated with the ESG scores but is significantly correlated with all other variables of interest at $p \leq 0.001$. This simple correlation analysis does not address issues of causality, but it provides initial evidence that financial performance and CSR are directly related.

Table 4 descriptive statistics

Variable	N	Mean	Std. Dev	Min	Max
ROA	307	.071253	.0660025	-.7011	.4354
EBITDA- margin	307	.2457334	.1795464	-1.406149	1.137612
ROIC	307	.1118181	.102679	-1.0822	.7995
Financial leverage	307	.2328156	.1496822	0	.7635531
Total assets	307	6.40e+07	1.94e+08	696089	2.62e+09
Market capitalization	307	3.91e+07	6.83e+07	648052	7.80e+08
Ln (total assets)	307	16.81554	1.335468	13.45323	21.68741
Ln (Market capitalization)	307	16.74622	1.126924	13.38173	20.47449

Note; Ln = natural logarithm

Table 5 correlation matrix

	ESG Score	ROA	ROIC	Financial leverage	EBITDA-margin	Market capitalization (Ln)	Total Assets (Ln)
ESG Score	1.000						
ROA	0.059***	1.000					
ROIC	0.088***	0.902***	1.000				
Financial leverage	0.018	-0.128**	-0.251***	1.000			
EBITDA-margin	-0.075***	0.301***	0.2134***	0.185***	1.000***		
Market capitalization (Ln)	0.296*** (0.457)***	0.108*** (0.171)***	0.110*** (0.194)***	-0.135*** (-0.144)***	0.099*** (0.187)***	1.000 (0.7689)***	
Total assets (Ln)	0.164*** (0.389)***	-0.166*** (-0.277)***	-0.120*** (-0.180)***	-0.144*** (-0.130)***	0.061*** (0.099)***	0.3965*** (0.378)*** ((0.710))***	1.00 (0.6172***) ((1.00))

Note: + ≤ p 0.1; *p ≤ 0.05; **p ≤0.01; ***p≤0.001

IV. Results

A. Random effects model

Table 6 presents the results of the random-effects regression analysis using CFP as depended variable and CSR as the independent variable, controlling for risk, size and industry (industry is omitted to save space and to prevent clustering of tables). In all nine models, CSP is the independent variable whilst the dependent variable CFP varies. Model 1 and 2 represent the results using ROA as the depended variable, controlling for size in two ways. Model 3 is a dynamic panel model, thus including the first lag of the dependent variable, which is a valuable component in a panel regression. By including lagged values of the dependent variable, we have to acknowledge the fact that it adds a new source of endogeneity bias. Models 4-6 represent a similar approach to previous models 1-3, measuring CFP by EBITDA-margin. Similarly models 7-9 represent the results using the approach described in model 1-3, calculating CFP by ROIC.

Measuring CFP by ROA, we found a significant and positive result for the independent variable at the $p \leq 0.001$, in model 1 and 3 and insignificant and negative results in model 2. Even though the effects of ESG scores on ROA is rather small in models 1 and 3, they support hypothesis 1, stating that CSR positively affects corporate financial performance.

Measuring CFP by EBITDA-margin, we found a significant and positive result for the independent variable in model 4 at $p \leq 0.01$. On the other hand, we found significant and negative results in models 5 and 6 at $p \leq 0.01$ and $p \leq 0.001$ respectively. These spurious results fail to provide a clear answer to the second hypothesis.

Lastly, measuring CFP by ROIC, we found a significant and positive result for the independent variable at the $p \leq 0.001$, in model 7 and 9 and insignificant and negative results in model 8. Even though the effects are small in models 7 and 9, they support hypothesis 3.

Furthermore, we find financial leverage to be significant in every model, in general, financial leverage seems to negatively affect CFP, whilst acknowledging the fact that model 6 is the only model to predict a positive and significant estimator for financial leverage. Finally, we observe a larger R^2 when adding the first lag of the dependent variable. Finally, we find significant results for both measurements of size, which interestingly provide spurious results depending on the measurement of size and the measurement of CFP. When controlling for size by the LN of market capitalization, it significantly lowers the estimator of ESG score in all

models. Including the first lag of the dependent variable, provides significant results at p ≤0.001 for all nine models, moreover it increases the R^2 and the test statistic.

Table 6 Random-effects model

Dependent variable: ROA	Model 1	2	3
Independent variable: ESG Score	.0005401***	-.0001338	0.0002347***
Control variables			
Financial leverage	-0.0925284***	-.086119 ***	-.0382672***
Ln (total assets)	-.0123578***		-.0080258***
Ln (market capitalization)		.0153134***	
First lag ROA			.4886155***
Constant	.2427429***	.0466846***	.1567357 ***
R^2	0.1997	0.1696	0.4270
Wald chi2 -(df)	293.10 – (12)	325.50 - (12)	2277.15 – (13)
Dependent variable: EBITDA-margin	Model 4	5	6
Independent variable: ESG Score	.0006171**	-.0006142 **	-.0005976***
Control variables			
Financial leverage	-.0671843**	-.0592198**	.0765085***
Ln (total assets)	.00956**		
Ln (market capitalization)		.0554158 ***	.0150302***
First lag EBITDA-margin			.666732***
Constant	.0409611	-.6716316***	-.1617828***
R^2	0.1369	0.1969	0.6293
Wald chi2 – (df)	132.67 – (12)	381.89 – (12)	5187.14 – (13)
Dependent variable: ROIC	Model 7	8	9
Independent variable: ESG Score	.0008312***	-.0000831	.0003887***
Control variables			
Financial leverage	-.1880323***	-.1814973***	-.0919784***
Ln (Total assets)	-.013992***		-.0089882***
Ln (Market capitalization)		.0237002***	
First lag ROIC			.5398743***
Constant	.2923044***	-.3003353 ***	.1829373***
R^2	0.2035	0.1936	0.4685
Wald chi2 – (df)	289.44 – (12)	359.64 – (12)	2693.88 – (13)

Note: + ≤ p 0.1; *p ≤ 0.05; **p ≤0.01 ***p ≤0.001

A.1. Breusch and pagan Lagrange Multiplier test

The Breusch and Pagan Lagrange Multiplier test was applied to the random effects model estimates to test whether Pooled OLS regression was the appropriate model to apply for analysis. The Breusch and Pagan Lagrange Multiplier test for random effects results (Table 7) rejected the null hypothesis that the Pooled OLS model was appropriate, with the exception being the models 3,6 and 9, where we acknowledge the fact that we added a new source of endogeneity bias by including the first lag of the dependent variable.

Table 7: Breusch and pagan test

Depended Variable	ROA		
Testing models	1	2	3
Breusch and Pagan LM test statistic	1502.01	1732.79	0.00
Prob>chibar2	0.0000	0.0000	1.0000
Depended Variable	EBITDA-margin		
Testing models	4	5	6
Breusch and Pagan LM test statistic	5450.83	4968.46	0.00
Prob > chibar2	0.0000	0.0000	1.0000
Depended Variable	ROIC		
Testing models	7	8	9
Breusch and Pagan LM test statistic	2246.12	2422.68	0.00
Prob > chibar2	0.0000	0.0000	1.0000

Note:

B. Fixed effects model

Table 8 presents the results of the fixed effects within regression counterpart of the random effects regression models, displayed in table 8. The fixed effects model was run, to appropriately select between the random-effects and fixed-effects model. The fixed-effects model removes the dummy variables which were used to control for industry-specific effects. We observe a lower R^2 in the fixed-effects models, compared to the random-effects models. The results of models 1 and 3, are significant and positive for the independent variable at the p ≤0.001 in model 1 and 3. Meanwhile the results of model 2 are insignificant and negative results. Concluding that the results show similar observations when measuring CFP by ROA in the fixed-effects models, compared to the random-effects models. Next to that, we observe

similar results for size and financial leverage compared to the random-effects model, assets having a significant and negative impact whilst market capitalization is significant and positive. Moreover, financial leverage remains negative and significant at p ≤0.001.

Measuring CFP by EBITDA-margin, we found a significant and positive result for the independent variable in model 4 at the p ≤0.001. Whilst we found significant and negative results in models 5 and 6 at p ≤0.001. On the contrary to the random-effects model, ESG score remains significant in all three models at p ≤0.001, but similar to the random-effects model, the results remain ambiguous. When controlling for size observe significant and positive results at p ≤0.001 for both market capitalization and assets. Moreover, when controlling for financial leverage we observe negative and significant results at p ≤0.001, whilst the random-effects model 6 estimates a positive and significant effect of financial leverage on EBITDA-margin.

Lastly, measuring CFP by ROIC, we found a significant and positive result for the independent variable at the p ≤0.001, in model 7 and 9 and insignificant and negative results in model 8. Even though the effects are small in models 7 and 9, they support hypothesis 3. Financial leverage remains negative and significant at p ≤0.001. When controlling for size by assets observe negative results in model 7 at p ≤0.01 and insignificant results in model 9. Meanwhile, controlling for size by market capitalization we observe positive and significant results at p ≤0.001. Results show a larger R^2 when adding the first lag of the dependent variable, which is comparable with the random-effects model. Finally, we observe that controlling for size by the LN of market capitalization, it significantly lowers the estimator of ESG score in all models. Including the first lag of the dependent variable, provides significant results at p ≤0.001 for all nine models, moreover it increases the R^2 and the test statistic.

Table 8 Fixed effects model

Dependent variable: ROA	Model 1	2	3
Independent variable: ESG Score	.0005858***	-.0000204	.0005433***
Control variables			
Financial leverage	-.1282141***	-.1454225***	-.0949139***
Ln (total assets)	-.0060771**		-.0075159**
Ln (market capitalization)		.0222209***	
First lag ROA			.2127417***
Constant	.1712822***	-.2658898***	.1755665***
R^2	0.0654	0.1696	0.3159
F	39.71	82.50	64.98
corr(u_i, Xb)	-0.0925	-0.4396	0.3309

Dependent variable: EBITDA-margin	Model 4	5	6
Independent variable: ESG Score	.0006841***	-.0002701	-.0001316
Control variables			
Financial leverage	-.1954688***	-.184887***	-.1430874***
Ln (total assets)	.035326***		
Ln (market capitalization)		.0625165***	.0492006***
First lag EBITDA-margin			.1720774***
Constant	-.3401661***	-.74338***	-.5786534***
R^2	0.0007	0.0118	0.1788
F	30.44	102.18)	80.16
corr(u_i, Xb)	-0.4128	-0.3567	0.0333
Dependent variable: ROIC	Model 7	8	9
Independent variable: ESG Score	.0008488***	-.0000442	.0007636***
Control variables			
Financial leverage	-.1995403***	-.2260687***	-.1433028 ***
Ln (Assets)	-.0103569**		-.0119409
Ln (Market capitalization)		.0318718 ***	
First lag ROIC			.219052***
Constant	.286048 ***	-.3668655***	.2808721***
R^2	0.1242	0.0854	0.3882
F	43.06	82.42	69.74
corr(u_i, Xb)	0.0592	-0.3056	0.4354

Note: + ≤ p 0.1; *p ≤ 0.05; **p ≤0.01 ***p ≤0.001

B.1. Hausman test

"To decide between fixed or random-effects we run a Hausman test where the null hypothesis is that the preferred model is random-effects versus the alternative the fixed-effects model." Greene (2008). Furthermore, we fit the random-effects models as a fully efficient specification of the individual effects under the assumption that they are random and follow a normal distribution. From the results of the Hausman test (table 9), we can conclude that the current initial hypothesis, the individual-level effects are adequately modelled by a random-effects model, is resoundingly rejected. The exception being model 7, which results in a test statistic of 0.6412.

Table 9: Hausman test

Depended Variable	ROA		
Testing models	1	2	3

Hausman test	17.55	77.42	1029.04
Chi-sq. statistic	Prob>chi2 = 0.0005	Prob>chi2 = 0.0000	Prob>chi2 = 0.0000
Degrees of freedom	3	3	4
Depended Variable	EBITDA-margin		
Testing models	4	5	6
Hausman test	98.71	127.00	1912.78
Chi-sq. statistic	Prob>chi2 = 0.0000	Prob>chi2 = 0.0000	Prob>chi2 = 0.0000
Degrees of freedom	3	3	4
Depended Variable	ROIC		
Testing models	7	8	9
Hausman test	1.68	33.31	1247.64
Chi-sq. statistic	Prob>chi2 = 0.6412	Prob>chi2 = 0.0000	Prob>chi2 = 0.0000
Degrees of freedom	13	3	4

Note:

C. CSR as depended variable

In Table 10 presents the results of the random effects regression analysis using CSR as depended variable and CFP as the independent variable, controlling for risk, size and industry (industry is omitted to save space and to prevent clustering of tables). In all models, CSR will be the depended variable, whilst the independent variable CFP will be measured in ROA, EBITDA-margin and ROIC, yielding different models.

Firstly, measuring CFP by ROA, we found significant and positive results in models 1 and 3 at $p \leq 0.001$ and $p \leq 0.05$ respectively, whilst we found insignificant and negative results in model 2. Results suggest that size has a positive and significant effect on ROA at $p \leq 0.001$. Interestingly we observe financial leverage to be positive and significant at $p \leq 0.001$ in models 1 and 3, whilst it is negative and significant at $p \leq 0.001$ in model 2.

Secondly measuring CFP by EBITDA-margin, we found a significant and positive result for the independent variable in model 4 at $p \leq 0.001$. Whilst we found significant and negative results in model 5 $p \leq 0.01$ and insignificant negative results in model 6. Financial leverage is positive and significant in models 4, 5 and 6 at $p \leq 0.001$, $p \leq 0.001$, $p \leq 0.01$, respectively. Size remains positive and significant at $p \leq 0.001$.

Lastly, measuring CFP by ROIC, we found a significant and positive result for the independent variable in model 7 and 9 at $p \leq 0.001$ and $p \leq 0.01$ respectively, whilst we found a

negative and insignificant result in model 8. We find strictly positive results for financial leverage, which are significant at p ≤0.001 in model 7 and 8, and significant at p ≤0.01 in model 9. Furthermore, we find positive significant results for size and in all models tested, indicating that larger firms might engage in more CSR activities. Even though the models are not able to capture all the factors that determine CSR and are prone to biases, they indicate a potential simultaneity between CSR and CFP in our dataset when measured by ROA, ROIC and EBITDA-margin, which is in-line with the findings of Nelling and Webb (2008). Including the first lag of the dependent variable, provides significant results at p ≤0.001 for all nine models, moreover it increases the R^2 and the test statistic.

Table 10 Random-effects model

Panel A *Dependent variable:* ESG score	Model 1	2	3
Independent variable: ROA	19.46402***	-1.841559	6.295004**
Control variables			
Financial leverage	15.33378 ***	-17.48181***	2.639802**
Ln (total assets)	10.45615***		.4860441***
Ln (market capitalization)		8.581436***	
First lag ESG score			.8935005***
Constant	-132.4687 ***	-99.52703***	-2.681165
R^2	0.2729	0.2636	0.8734
Wald chi2 -(df)	934.58– (12)	1049.03 – (12)	21083.89 – (13)
Panel B *Dependent variable: ESG score*	Model 4	5	6
Independent variable: *EBITDA-margin*	4.955416***	-3.698142**	-.0343621
Control variables			
Financial leverage	13.73797***	17.23755***	2.27148**
Ln (total assets)	10.28271***		
Ln (market capitalization)		8.740816***	.5840392***
First lag ESG score			.666732***
Constant	-129.4934	-101.4217***	-3.924532+
R^2	0.2633	0.2718	0.8734
Wald chi2 – (df)	899.57 – (12)	1057.24 – (12)	21084.64 – (13)
Panel C *Dependent variable: ESG score*	Model 7	8	9
Independent variable: ROIC	12.77021***	-.8676206	4.114877**
Control variables			
Financial leverage	15.61306***	17.55023***	2.969859**
Ln (total assets)	10.42449***		.4669185 ***
Ln (market capitalization)		8.571745 ***	

First lag ESG score			.8930093 ***
Constant	-131.9219 ***	-99.40445 ***	-2.378675 ***
R^2	0.2740	0.2630	0.8734
Wald chi2 – (df)	932.27 – (12)	1048.52 – (12)	21086.84 – (13)

Note: + ≤ p 0.1; *p ≤ 0.05; **p ≤0.01 ***p ≤0.001

D. Two-staged least squares regression

Table 11 presents the results from the 2SLS Anderson Hsiao regression. Model 1, 3 and 5 represent the fixed-effects within IV regression, The independent variable ESG score is significant and positive when CFP is measured by ROA and ROIC at p ≤0.01, we find negative and significant results for the ESG score when CFP is measured by EBITDA-margin at p ≤0.1 Financial leverage and remain and significant at p ≤0.001 for all three measurements of CFP.

In model 3, market capitalization is used as control variable for size, because previous models indicated that market capitalization has more pronounced impact on EBITDA-margin. We find size to have a significant and negative effect on CFP in model 1 and 5 at p ≤0.001, when measured by assets. The second lag of the dependent variable is positive and significant in models 1 and 5 at p ≤0.01, whilst we find a negative and insignificant result in model 3. All three models provide a high-test statistic of 9196.28, 23658.00 and 10398.93 for models 1, 3 and 5 respectively.

Model 2, 4 and 6 represent the first difference IV regression these models should account the most for the potential endogeneity and simultaneous equation biases.

In all three models we find no significant relationship between ESG Scores and CFP, measured by ROA, which does not support our hypotheses and contradicts previous results. Financial leverage remains negative and significant at p ≤0.001, which is in line with our previous findings. Model 4, market capitalization is used as control variable for size, because previous models indicated that market capitalization has more pronounced impact on EBITDA-margin. The results of model 2, and 3 suggest that size has a positive and significant effect at p ≤0.1 and p ≤0.001 respectively, whilst the results of models 6 are insignificant. The second lag of the dependent variable has a positive effect at p ≤0.01, p ≤0.001 and p ≤0.05 in models 2, 4 and 6 respectively.

Table 11 Anderson Hsiao instrumental variable model.

Panel A	Model 1	2	
Dependent variable: ROA	fixed	First difference	random effects?

Independent variable: ESG Score	.0002947**	.0001388
Control variables		
Financial leverage	-.1055425***	-.1753033***
Ln (Total assets)	-.0105637***	.0109955 +
Second lag ROA	.2294083**	.1778627**
Constant	.2440751***	.0004765
R^2	0.3558	0.0202
Wald chi2 -(df)	9196.28 – (4)	91.78 – (4)
Panel B *Dependent variable: EBITDA-margin*	Model 3	4
Independent variable: ESG Score	-.0004364+	.000179
Control variables		
Financial leverage	-.1829741***	-.2303419***
Ln (Market capitalization)	.0593266***	.059497***
Second lag EBITDA-margin	-.1362435	.2256187***
Constant	-.6444113***	-.002289
R^2	0.0345	0.1497
Wald chi2 – (df)	23658.00– (4)	84.19 – (4)
Panel C *Dependent variable: ROIC*	Model 5	6
Independent variable: ESG Score	.0004393**	.000198
Control variables		
Financial leverage	-.1510018***	-.2357754***
Ln (Total assets)	-.0172626***	.0053071
Second lag ROIC	.2523725**	.1218733*
Constant	.3895625***	-.0015017***
R^2	0.4231	0.1382
Wald chi2 – (df)	10398.93 – (4)	79.19 – (4)

Note: + ≤ p 0.1; *p ≤ 0.05; **p ≤0.01 ***p ≤0.001

V. Conclusion

A. Conclusion

Numerous studies have examined the relationship between CSR and CFP, and most have found that these two entities are directly related. In this paper we analyzed the relationship between CSR and CFP using a comprehensive data set. First, we analyze the relationship using standard OLS analysis, which we extended with a fixed-effects model and Anderson Hsiao instrumental variable model. The standard OLS-regression gives results that are consistent with previous studies such as Nelling and Webb (2008), Waddock and Graves (1997) and Hull and Rothenberg (2008). Stating that financial performance is significant in explaining variability in CSR, with the exception for the EBITDA-margin for which we found spurious results.

Generally, our results do not change when we introduce the fixed-effect models. The fact that the results of the fixed-effects and random-effects models are similar, gives strong initial indications that ESG influence CFP.

However, when we introduce the Anderson and Hsiao IV model, the results no longer suggest a strong relationship between CSR and CFP. The Anderson and Hsiao IV model should control for most of the biases in our dataset, therefore these results should be the most robust. Because the results from the Anderson and Hsiao IV model differ with previous findings, we observe spurious results depending on the methology used. Therefore, the relationship between CSR and CFP is not as straightforward as previous models might have indicated.

Moreover, when we investigate whether CFP influences ESG scores, we find a strong initial relationship, suggesting that large firms that are financially doing well, might be more inclined to exercise CSR activities. This so-called ‘virtuous circle’ first mentioned by Nelling and Webb (2008), appears to exist in our dataset of S&P 500 companies based in the United-States of America for the period 2008-2018. Which indicates that our dataset possibly observes simultaneous equation bias.

In summary, CSR and CFP appear to be related when using traditional OLS regression models, however the results differ with the measurement of CFP. Moreover, this effect weakens when examined using more sophisticated methods such as the Anderson and Hsiao instrumental variable method. Additionally, we find initial evidence that financial performance influence CSR activities, indicating that firms who show strong financial results are more included to participate in CSR activities. All in all, if CSR activities provide benefits to the firms, then CSR activities are positively related to firm size and they appear to divulge

themselves in forms unrelated to financial performance, given the impact of ESG scores are relatively small and have the tendency to provide spurious results.

B. Limitations and further directions

B.1 Limitations

This study relies entirely on secondary data provided by Datastream/Eikon and the measurements of CFP, as a results errors in the dataset will directly influence the results of this study. Additionally, more extensive regression analyses could be performed to control for any biases that this study failed to consider, given that this study was performed with limited knowledge of panel data and a limited time span. Moreover, some of the ambiguity surrounding the financial results of CSR may be related to variations in how CSR is defined and measured.

B.2 Further research directions

It would be interesting to investigate the relationship between a firm's stock performance and CSR activities, given investors growing interest in sustainable investment alternatives. This would provide new insights in the potential benefits that companies can extract from participating in CSR activities. Next to that, it would be helpful to investigate whether the relationship between CSR and CFP hold for North American companies, when using different measurements of CSR.

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Appendices

Appendix A

Table I. Selected empirical papers on CSR

Author(s)	*Methodology*	*Nature of CSR event/action*	*Key results*
Abowd, Milkovich and Hannon (1990)	Event study	Human resource	No consistent pattern of increased or decisions decreased stock price.
Worrell, Davidson, and Sharma (1991)	Event study	Layoff programs	Investors react negatively to layoff announcements, especially when they are due to financial distress.
Clinebell and Clinebell (1994)	Event study	Plant closures	Longer periods of advance notice of plant closings result in greater losses in shareholder wealth.
Posnikoff (1997)	Event study	Divestment from South Africa	Divestment enhanced shareholder value.
Wright & Ferris (1997)	Event study	Divestment from South Africa	Divestment had a negative effect on shareholder value
Teoh and Wazzan (1999)	Event study	Divestment from South Africa	Divestment had a neutral effect on shareholder value.
Aupperle, Carroll, and Hatfield (1985)	Regression analysis	An overall firm-level index of CSR	There is a neutral relation between CSR and profitability.
McGuire, Sundgren, and Schneeweis (1988)	Regression analysis	An overall firm-level index of CSR	Prior profitability was more closely related to CSR than was subsequent performance.
Russo & Fouts (1997)	Regression analysis	Environmental performance	There is a positive relation between environmental performance and financial performance.
Waddock & Graves (1997)	Regression analysis	An overall firm-level index of CSR-KLD data	CSR results in an improvement in firm performance.
McWilliams & Siegel (2001)	Regression analysis	An overall firm-level index of CSR-KLD data	There is a neutral relation between CSR and profitability.

Hillman & and Keim (2001)	Regression analysis	'Social issues' CSR and 'stakeholder management' CSR-KLD data	'Stakeholder management' CSR is positively correlated with shareholder wealth creation (market value added); 'social issues' CSR is not.

Note. The table is retrieved from McWilliams, Siegel, & Wright (2006)