Erasmus University Rotterdam
Erasmus School of Economics
Bachelor Thesis Financial Economics

Shifting consumer preferences towards sustainability impacting corporate profitability.

Name: Jurriaan Bos
Student number: 483913
Supervisor: dr. Ruben Cox
Second assessor: dr. Joris Kil
Date final version: 11-07-2020

Abstract:

Sustainability is becoming a necessity rather than a choice. The transition is boosted by the introduction of the Sustainable Development Goals by the UN. This study examines the relationship of sustainability on corporate profitability between 2014-2019. The entire sample consists of persistently included firms in the S&P 500 and sustainable firms are also consecutively included in the DJSI. According to the main OLS model, no evidence was found to assume that sustainability positively impacts corporate profitability. Furthermore, consumer preferences tend to be shifting, showing higher willingness-to-pay for sustainable products. Therefore, this study investigates whether the effect of sustainability differs over time. Between 2014-2016, a significant positive effect of sustainability on ROA and ROE was found. In contradiction to the suggested increasing trend towards sustainability, no significant impact for the period 2017-2019 was found. Additionally, interaction terms between year and sustainability denied the existence of a trend. The overall effect of sustainability on ROA and ROE was positive but for 2017 and 2018, significant negative effects were observed. The positive effect on ROA became neutral and for ROE and ROS even became negative. Probably, this is caused by a surge in sustainable investments and corresponding integration costs. In the short term, these changes and reallocations tend to show a negative effect on corporate performance but in the long run a positive effect. Moreover, in the past years, companies started integrating ESG objectives into their renumeration structure. This could improve corporate performance and CSR engagement. This study includes an interaction effect between sustainability and stock compensation to examine whether stock compensation affects profitability and whether the effect differs among the sustainable and conventional companies. Therefore, this study contributes to the existing literature by merging to formerly separate topics.

Keywords: Sustainability, DJSI, shifting consumer preferences, corporate performance, profitability, CSR, ESG

Table of contents

List of abbreviations

CSR	Corporate social responsibility
ESG	Environmental, social and governance
SRI	Socially responsible investing
DJSI	Dow Jones Sustainability Index
SAM	Sustainable asset management
IV	Instrumental variable
OLS	Ordinary least squared
SIC	Standard industrial classification
PR	Profitability ratio
ROA	Return on assets
ROE	Return on equity
ROS	Return on sales
VIF	Variance inflation factor
BLUE	Best linear unbiased estimator
FE	Fixed effects
RE	Random effects
OSHA	Occupational safety and health administration

1 INTRODUCTION

In 2015 the United Nations published 17 Sustainability Development Goals (SDGs), emphasizing the urgency of the transition towards a sustainable future (UN, 2015). The SDGs replaced the Millennium Development Goals (MDGs), whose main goal was to fight extreme poverty. SDGs cover socially engaged topics regarding the challenging future of the earth. Besides economic challenges, SDGs include major topics like energy production, gender equality and climate change. The replacement of MDGs by SDGs underscores the necessity of sustainability, becoming a need rather than a nice to have.

Environmental and social disasters tend to be events with massive media coverage. The disaster with the Deepwater Horizon, arguably the largest oil spill ever, killed thousands of birds and aquatic animals and caused permanent ecological damage (Mohit, 2020). As a consequence, the stock price of the responsible company BP plummeted by more than 50% in the weeks following the disaster (Fodor & Stowe, 2012). This is only one of numerous examples where investors ruthlessly penalize companies causing environmental or social scandals. Companies experience more pressure from politicians, stakeholders, consumers and activists. Increased interest in sustainability forces companies to focus more on environmental, social and governance (ESG) factors and integrate these factors into their decision-making (Mögele and Tropp, 2010). Managers and board directors cannot ignore these major topics anymore, since settlements are becoming too costly. Consequently, companies are reviewing their cost-benefit analysis and reconsider their decisions.

In recent years, the integration of ESG factors into business has increased rapidly. Various theories try to explain why companies adopt sustainable operations. Companies advocate activities in corporate social responsibility (CSR) to increase their competitive advantage (Porter & Kramer, 2002), to express their superior political position (Garriga & Méle, 2004), as integration of consumer demand (Young et al., 2010) or because of ethical motives (Schaltegger & Burritt, 2018). However, pollutive industries reliant on natural resources face enormous challenges. Sustainable operations require substantial investments and reallocation of resources (Lopez et al., 2007). The sustainable investments will take many years to generate benefits (Orsato, 2009). Especially in the short term this might pressure companies' financial results. According to the *agency theory*, this hampers the approval of the investments (Jensen & Meckling, 1979). Managers devise their own cost-benefit analysis to evaluate whether to adopt sustainable operations. And if they decide to do so, will they invest the necessary minimum, or do they want to excel and become the leader in sustainability? To examine the benefits of sustainability, this study will investigate the following question:

"Do sustainable operations contribute to higher corporate profitability?"

The majority of the existing literature suggests a positive relation between sustainability and corporate profitability (Margolis & Walsh, 2003). Sustainable operations enhance the competitive position of a firm (Porter & Kramer, 2006). In combination with higher willingness-to-pay for sustainable products, these factors could improve financial results (Van de Loo, 2014; 2015). However, some studies examined a neutral or even negative relation. This might be explained by the investigated time period or a surge of sustainable investments with related integration costs (Weber, 2008).

This study is relevant due to recent developments regarding CSR. The urgency of this topic is perfectly captured by former CEO of Unilever Paul Polman (Smit, 2019): "Enterprises that do not include negative externalities on their balances in the future will not survive and will disappear in the long run." Different time periods could provide completely different conclusions. Therefore, a study based on recent years and focus on the potentially changing impact over time is relevant to gain new insights in this rapidly developing field. Moreover, academics show growing interest in ESG-related executive compensation. Integrating CSR objectives into executive compensation could contribute positively to corporate performance and the adoption of CSR (Flammer, Hong & Minor, 2019). However, not many studies included stock compensation into their research on the impact of sustainability. Therein, this study merges two formerly separate topics.

The research is structured as follows. Chapter 2 discusses the existing literature and hypotheses. Chapter 3 describes the data and chapter 4 covers the research design. Next, the results will be presented in chapter 5 and finally, the conclusions, recommendations, limitations and suggestions for further research will be discussed in chapter 6.

2 LITERATURE REVIEW

The relation between sustainability and corporate performance has been examined elaborately. However, these studies show great divergence in applied concepts and definitions. Therefore, this chapter covers the definition of CSR (section 2.1), the measurement of CSR (section 2.2) and corporate performance (section 2.3). Subsequently, three hypotheses will be derived based on different incentives to integrate sustainability into business (section 2.4).

2.1 DEVELOPMENT OF CORPORATE RESPONSIBILITY

Since the beginning of the 21st century, sustainability is a subject of debate. However, academics have started to address the importance of sustainability a long time ago. Thus far, studies have not reached a consensus regarding the concept of sustainability. There's no unified and precise definition for sustainability (Scherer & Palazzo, 2007; Wood, 2010). The broad interpretation has been perfectly captured by Votaw and Sethi (1973): *"Corporate responsibility means something, but not always the same to everybody"*. The study claims that some people perceive it as a legal responsibility or even a liability, some consider it an ethical issue, others simply equate it with charity contributions and some associate it with social consciousness. Moreover, research on sustainability was described as: *"an electric field with loose boundaries, multiple memberships, and differing training/perspectives: broadly rather than focused. The map of the overall field is quite poor"* (Carroll, 1994). In a few sentences these studies describe the diverse perceptions of social responsibility. Therefore, it is useful to provide a chronological overview how the term corporate sustainability has evolved.

The introduction of *social responsibilities of the Businessman* (Bowen, 1953) entailed the first guide how a businessman should conduct himself ethically correct. This book was a forerunner in the literature study of social responsibility. Eventually, this topic would develop into the important definition CSR that will discussed later on. Friedman (1962) was one of the first academics who involved corporations into the social responsibility discussion. He claimed that "*A firm is socially responsible to increase its profit*". Several years later, he endorsed his statement: "*The only responsibility of a business towards society is the maximization of profits to the shareholders, within the legal framework and the ethical custom of the country"* (Friedman, 1970). For the first time the firm's obligation towards society was mentioned. However, in the seventies the general attitude towards social responsibility was a little skeptical. Firms considered it as a burden and a waste of money and time, rather than an opportunity (Blumberg, 1970).

Subsequently, one of the most widely accepted definitions was formed by Carroll (1979) in an attempt to summarize existing literature. He designed a three-dimensional conceptual model to analyze corporate performance. He introduced the term *corporate social responsibility (CSR)* and claimed: *"CSR is the social responsibility of a business which included economic, legal, ethical and discretionary expectations that society has of organizations at a given point of time."* The last part implicitly addresses the dynamic character of the discussion. Following this definition, Brundtland (1987) added scarcity and depletion of natural resources into the discussion. He emphasized the consideration to make humankind better off while nature limits these aspirations.

Nowadays, Van Marrewijk's view (2003) is considered as leading classical theorem. A successful company needs a certain level of trust, respect and dedication and others should benefit from mutual activities. Furthermore, there's an increasing trend considering CSR as an important determinant of competitive advantage (Porter & Kramer, 2006). CSR provides an opportunity rather than a burden or to prove wrongdoing. During the Who Cares Wins conference of the UN, the definition ESG was mentioned for the first time (IFC, 2005). This term indicates environmental, social and governance (ESG) factors that are closely related to CSR. No studies with respect to sustainability are conducted without mentioning either CSR or ESG. CSR requires the integration of multiple dimensions like economic, environmental and social aspects (Schaltegger & Burrit, 2005). These factors contribute to the realization of sustainable operations in the long run. Additionally, CSR covers a dynamic process of building shared value. Both the company and society should benefit (Porter et al., 2011). Finally, sustainability is described as the balance between well-being of future generations. To what extent does the increase of capital and knowledge by using natural resources compensate for draining the reserves of the earth (Kuhlman & Farrington, 2010).

In general, three main approaches regarding CSR can be detected over the years (Van Marrewijk, 2003). First, the *shareholder approach* was commonly acknowledged, focusing on maximizing shareholder value (Friedman, 1962). Next, the *stakeholders' approach* was introduced (Freeman, 1984). A firm is not only accountable to shareholders but should take stakeholders' interests like employees, customers and business partners into account as well

(Freeman, 1984). Recently, the *societal approach* became leading. Firms are part of society and carry the responsibility to adopt a broader perspective on business. Therefore, firms need to adjust the way they operate in order to serve the needs of society (Van Marrewijk, 2003).

2.2 MEASUREMENT OF CORPORATE SOCIAL RESPONSIBILITY

There are countless ways to measure social responsibility, but no specific method is assumed to be most accurate (Montiel, 2008; Galbreath & Shum, 2012). Generally, three dominant approaches are employed to measure CSR that will be discussed below (McGuire, Sundgren & Schneeweis, 1988). Nowadays, these methods are still widely applied (e.g. Aras, Aybars & Kutlu, 2010).

Firstly, the most commonly used method concerns expert evaluations and corporate policies (McGuire et al., 1988). During the 21st century, the number of indices based on sustainability has increased rapidly (Fortuna, Simion & Gavrilescu, 2011). Indices tend to be a powerful tool because they summarize key elements of the firms (Cochran & Wood, 1984). This study uses the Dow Jones Sustainability Index (DJSI) as indicator for sustainable performance. The performances of thousands of companies are evaluated by experts of the Sustainability Asset Management (SAM) group. Every year, they publish a report with top performers on sustainability. The downside of this measurement is accuracy. The quality is highly dependent on access to firm-specific information and the expertise of the investigator (Abbott & Monsen, 1979). Academics also create their own index by splitting CSR into multiple components. For example, Ameer and Othman (2012) evaluated the performance on community, environment, diversity and ethical index. The accuracy of this approach is limited since it only covers a small number of sustainability issues (McGuire et al., 1988).

Secondly, previous studies applied content analysis to proxy for CSR. Researchers assign a sustainability score on the basis of information disclosure via annual corporate reports and other documents (McGuire et al., 1988). For example, the performance on sustainability was captured by the number of sentences containing or dealing with sustainability in annual reports (Aras et al., 2010). However, there’s substantial criticism towards this approach since corporate actions and discussion of ESG are treated equal. While in fact, firms might operate markedly different than what they proclaim to do (Ullmann, 1985; Cochran & Wood, 1984). Additionally, content of public documents frequently contains more value to public relations rather than informational value (McGuire et al., 1988). This approach is also very subjective to the chosen words and sentences regarding sustainability.

Thirdly, preventing pollution and emission control can be taken as an indicator to measure CSR. Researchers tend to assess the negative environmental impact of companies. Nevertheless, this approach is very restricted since pollution touches only one dimension of sustainability (Aras et al., 2010). Therefore, this measurement is not widely applied in research.

2.3 MEASUREMENT OF CORPORATE PERFORMANCE

Corporate performance is an important topic in finance and hence widely investigated. Determinants such as capital structure and CEO compensation have been examined extensively in relation to corporate performance (e.g. Jensen & Meckling, 1979; Myers, 1984; Core, Holthausen & Larcker, 1999). However, no consensus has been reached on the most accurate way to measure corporate performance. A study based on 127 empirical studies executed over 30 years, provides great insights in the variety of measurements (Margolis & Walsh, 2003). These studies all examined the relationship between sustainability and corporate performance. Broadly speaking, the performance of a company is measured either via accounting-based or stock-based-based measures.

2.3.1 ACCOUNTING-BASED MEASURES

Accounting-based measures are expressions of economic and financial data in terms of money, hours or other units (Kaplan & Norton, 2005). They cover all possible information published in the profit & loss statement, balance sheet and cashflow statement. Accounting measures provide information ranging from profitability to liquidity. Measures such as revenues, net income or cashflows reflect the firm’s ability to create value and the debt-to-equity ratio reflects the exposure to risk. To compare relative performance among companies, usually financial ratios are calculated. Assuming that sustainable practices impact corporate performance, this difference should be reflected in the most significant accounting numbers (Lopez et al., 2007). Profitability ratios like ROA, ROE and ROS are widely applied accounting measures to assess corporate performance. These measures indicate whether sustainability is a profit driver or not. The main advantage of accounting-based measures results from the internal character, showing what is actually happening in the firm (Lopez et al., 2007). Moreover, CSR is assumed to be predominantly unsystematic, and accounting measures might be more appropriate to capture these unique firm attributes (McGuire et al., 1988). So, these measures are assumed to contain less noise than market-based measures. However, it's important to take into consideration that accounting measures are based on historical performances and do not reflect future expectations (McGuire et al., 1988). Additionally, this approach is more sensitive to managerial bias and differences in accounting procedures, which could affect the accuracy of the results. Lastly, it's important to control for several variables such as industry or risk, in order to draw solid conclusions from the analysis (Aras et al., 2010).

2.3.2 STOCK-BASED MEASURES

The second approach to measure corporate performance relates to stock-based measures. According to the efficient market hypothesis (EMH), stock prices reflect all available information (Malkiel & Fama, 1970). Stock prices reflect investors' expectations regarding the future, incorporating the ability to create value (Aras et al., 2010). If sustainable operations pay off, this should be reflected in stock prices as well. In contrast to accounting measures, stock-based measures focus on the future rather than historical performance. Additionally, they tend to be less receptive to managerial manipulation and different accounting procedures (Ullmann, 1985). Generally, investors' valuation of a firm is assumed to be a proper performance measurement (McGuire et al., 1988). However, merely relying on investors' valuation could be insufficient because a firm faces multiple constituencies (Pfeffer & Salancik, 2003). At last, market indicators include the perception that adopting a sustainable strategy might be a differentiating factor, but it is very difficult to isolate this effect (Cochran & Wood, 1984; Lopez et al., 2007). Macro-economic factors such as business cycle or speculation result in substantial fluctuations outside the companies' control and could blur the outcomes of the research.

2.4 CSR MOTIVES AND HYPOTHESIS DEVELOPMENT

Research in the field of corporate sustainability can be classified into four different territories: instrumental (section 2.4.1), political (2.4.2), integrative (2.4.3) and ethical theory (2.4.4) (Garriga & Méle, 2004). These theories explain the motives and incentives to invest in CSR. Based on these theories, hypotheses will be developed to answer the main research question: *"Do sustainable operations contribute to higher corporate profitability?"*

2.4.1. INSTRUMENTAL THEORY

The instrumental theory is the dominant approach for CSR. Sustainable operations serve as an instrument for wealth creation and hence, a mean to increase profits (Garriga & Méle, 2004). This aligns with Friedman's (1970) findings that the only responsibility of a firm towards society is to maximize shareholder value. As a matter of fact, this does not exclude topics as philanthropy because this might contribute positively to shareholder value (Mitchell, Agle & Wood, 1997). According to this theory, engagement in sustainable activities results from enlightenment of self-interest (Keim, 1978).

Instrumental theory can be split into three dominant views. The first and main view is based on gaining competitive advantage, assuring financial benefits in the long run (Majeed, 2011). Competitive advantage enables a firm to create superior value for customers (Porter, 2008; Dunk, 2007). Alongside with higher customer satisfaction, the firm can generate superior profits by offering high quality products at low cost (Saeidi et al., 2015). Social investments by a cluster or individually, could impact competitiveness and performance of all constituent companies substantially (Porter & Kramer, 2002). Sustainability might also increase profitability through efficiency gains by allocating resources more efficiently (Epstein & Roy, 2001; Kurucz et al., 2008). Additional value is created using fewer resources (Hedstrom & Swedberg, 1998; Majumdar & Marcus, 2001). Finally, a firm reduces its CSR-related risk whereby it's less vulnerable to bad publicity or customer boycotts (Weber, 2008).

The second view concerns increasing shareholder value, in line with a short term focus on profits (Garriga & Méle, 2004). This complies with the *good management theory*. Good management practice resulting from activities in social dimensions, empowers the relationship with shareholders and eventually improves financial performance (Freeman, 1984). This perspective is mostly highlighted in the *agency theory* (Jensen & Meckling, 1979). Nonetheless, this theory is nowadays not widely supported because it only serves shareholders' interest and not their stakeholders.

Thirdly, ESG investments affect the reputation and reliability of companies (McWilliams & Siegel, 2001). Companies should develop activities that entail win-win situations. Participating in a social project reinforces business reputation and prestige while simultaneously, charities receive substantial financial support (Smith & Higgins, 2000). Ideally, customers respond to the improved reputation by increasing purchases (Varadarajan & Menon, 1988). Furthermore, sustainable strategies might enhance employee's motivation, retention and recruitment (Weber, 2008). Basically, by activating people's intrinsic motivation, the firm creates goodwill and becomes more appealing to consumers and employees. Additionally, firms try to improve their reputation via product differentiating by including socially responsible attributes (Smith & Higgins, 2000; Kurucz, Colbert & Wheeler, 2008).

In conclusion, half of 109 conducted studies between 1972 and 2002 suggested a positive relationship investigating the impact of sustainability on corporate performance (Margolis & Walsh, 2003). Accordingly, the first hypothesis is constructed as follows:

Hypothesis (1): Sustainable operations increase corporate profitability.

Although the majority of existing literature suggests a positive relationship of sustainability on profitability, several studies found a neutral or even negative impact. Integration of sustainable operations requires substantial investments and increasing operating costs (Jensen, 2001). Focusing on CSR could blur the firm's main goal to maximize profit and deteriorates financial performance. A negative relationship would be consistent with *managerial opportunism hypothesis* (Preston & O'Bannon, 1997). This theory claims that expenditures on social performance are reduced to improve short term profitability and increase personal compensation. Contrary, in times of financial distress, firms try to distract attention from the fundamental profitability issues by increasing expenditures on social performances. Moreover, additional expenditures in research, training and risk prevention could erode the firm's competitive advantage and profitability (Vance, 1975; Bragdon & Marlin, 1972; Lopez et al., 2007). Also, reallocation of resources might induce substantial costs. Therefore, a negative relationship is possible on short term, since investments require time to generate incremental revenues (Simpson & Kohers, 2002).

Some studies question the causal direction of the relationship (e.g. McGuire et al., 1988). Between 1972-2002, 22 studies have investigated the effect of financial performance on CSR and 16 studies indicated a positive effect (Margolis & Walsh, 2003). This outcome suggests that good financial performance increases CSR engagement. The *slack resource theory* provides a good framework to analyze the impact of financial performance on sustainability (Weber, 2008; Kurucz et al., 2008). Only companies with superior resources can afford substantial investments in sustainability (Waddock & Graves, 1997; Artiach et al., 2010). According to this theory, sustainable firms achieve better financial results not necessarily due to CSR, but thanks to pre-existing superior resources. This would imply that prior financial performance has predictive value on CSR (McGuire et al., 1988). The positive impact as described in hypothesis (1), is possibly affected by simultaneous or reversed causality. This indicates endogeneity and thus affects the internal validity of the study. Therefore, this study examines the possibility of reversed causality via the following hypothesis:

Hypothesis (3): Higher profitability positively influences CSR engagement.

Several researchers encountered problems regarding validity and reliability in studies examining the relation between CSR and financial performance (Margolis & Walsh, 2003). Their concerns vary from omitted variables, sampling to methodology but mostly a need for a causal link between CSR and corporate performance. A recent study advocated the existence of an indirect relationship rather than a direct one (Saeidi et al., 2015). Sustainable operations would improve customer satisfaction, resulting in increased competitive advantage and reputation. This research suggested the influence of mediating factors.

2.4.2 Political theory

Leading businesses possess substantial political power and carry the responsibility towards society to operate in a sustainable way (Garriga & Méle, 2004). Firms that do not harness their power in a responsible way, will eventually lose their superior power (Davis, 1960). Large companies could set an example for the rest of the industry, accelerating the sustainable transition. Two important definitions are leading in this theory. *Corporate constitutionalism* refers to the duty of the dominant power to serve the rights of subjects (Davis, 1960; 1967). Moreover, the obligation of a firm to contribute to the community is defined as *corporate citizenship* (McIntosh et al., 1998).

2.4.3 Integrative theory

The continuity and growth of a firm heavily relies on the integration of social demand into business (Garriga & Méle, 2004). The reliance of society on a business, results in the legitimacy of the firm. Therefore, firms need to assure that their business' strategies match with social values. The establishment of social values is a dynamic process and strongly depends on zeitgeist and social developments (Dowling and Pfeffer, 1975). As a consequence, social values are not fixed but vary strongly over time (Preston & Post, 1981).

In recent decennia, several studies concluded a shift in consumer preferences (e.g. Van Loo et al., 2014; 2015). They observed a pattern of increased consciousness about environmental and social issues and introduced the term sustainable consumption (Seyfang, 2005; Young et al., 2010). Material goods play vital symbolic roles in our lives. The clothes people wear, the food they eat, all contribute to a person's identity. An individual derives his identity and status from material goods (Jackson, 2005). The role of consumption was perfectly described by Mary Douglas (1976): '*An individual's main objective in consumption is to help create the social world and to find a credible place in it.*'

The shift in consumer preferences offers opportunities for companies, by simultaneously integrating social demand and achieving competitive advantage. For specific products like wine and meat, studies found evidence of higher willingness-to-pay for products produced in a sustainable manner (Van Loo et al., 2014; Schäufele & Hamm, 2017). These studies suggest a rising trend that consumers are willing to pay a premium for sustainable goods and services. Hence, this study examines whether the impact of sustainability on corporate performance increases over time via the following hypothesis:

Hypothesis (2): The impact of sustainability on corporate performance increases over time.

In the context of integrative theory, one could also argue that CSR does not influence corporate performance. Normative pressure drives companies towards socially responsible operations (Lopez et al., 2007). Governments can play a decisive role by enforcing CSR, changing standards fundamentally and creating a new normal (Hawkes, 2001). However, the establishment of a new standard takes decennia and it's highly unlikely that this process has ended already. Moreover, a neutral relation could result from the fact that not all sustainable investments impact financial performance. Certain effects such as reducing environmental impact, retaining talent or employee satisfaction will not directly induce quantitative effects on financial results. It creates value in a broader sense than solely focusing on monetary indicators (Lopez et al., 2007). At last, investigated time frame might be relevant for the outcomes of the analysis. The transmission to society might be a slow process and traditional customers need time to adjust (Alexander, 2002; Ingram et al., 2005). In the short term, there might be a neutral relation while in the long term a positive effect can be observed.

2.4.4 Ethical theory

The ethical aspect of CSR is defined as the obligation or responsibility a company has towards society. The relation between society and business is based on ethical values (Garriga & Méle, 2004). This dimension was introduced by the publication of *Strategic Management: A stakeholder approach* (Freeman, 1984). This study claims that mangers have a fiduciary relationship with stakeholders, defined as *the normative stakeholder theory*. The addition of *a normative core of ethical principles* was needed to present guidelines how a firm should be managed ethically responsible (Freeman, 1994). Companies should incorporate social responsibility as an obligation with ethical values as primary reason, above anything else (Garriga & Méle, 2004). If a firm fails to act in a way that society considers responsible, other firms will overtake their position (Davis, 1960). At last, firms decide to engage in CSR because they assume it to be a common good, attaching significant value to society (Mahon & McGowan, 1991). Integrating sustainability into business improves individual well-being and the way of living on earth (Méle, 2002).

3 DATA

This chapter provides an overview of the included variables in this study (section 3.1), describes the sample selection and data collection (section 3.2) and finally discusses the transformation of the variables in section 3.3.

3.1 VARIABLE DEFINITIONS

3.1.1 DEPENDENT VARIABLE

As described in section 2.3, previous studies applied wide-ranging concepts to measure corporate performance (Margolis & Walsh, 2003). Academics agree on the fact that the dependent variable should reflect the profitability but have not reached consensus on the variables that reflect this best. Commonly used indicators are Tobin's Q (Lo & Sheu, 2007), Likert's scale to assess several dimensions (Ameer & Othman, 2012; Saeidi et al., 2015), profit before taxation (Lopez et al., 2007) and profitability ratios (Aras et al., 2010). This study applies profitability ratios ROA, ROE and ROS as dependent variables, following the perception that these profitability measures reflect corporate performance best (Saeidi et al., 2015). Moreover, financial investors associate higher profitability measures with greater value creation (McGuire et al., 1988; Berman et al., 1999). A change in business like CSR should be reflected in profit and loss statements and therefore profitability ratios (Lopez et al., 2007). Concluding, to examine whether sustainability impacts corporate performance, potential differences in the most important accounting ratios are investigated. To create a reliable overview, three different financial ratios will be used instead of solely focusing on one specific ratio. The three profitability ratios are calculated by dividing net income by total assets, by shareholder equity and by total sales. Table 1 provides an overview of the variables included in the main model.

3.1.2 INDEPENDENT VARIABLE

Corporate social responsibility is measured via a dummy variable, indicating whether a firm is included in the DJSI. The variable displays 1 for sustainable firms and 0 for conventional firms. Inclusion in the DJSI can be seen as certification of excellent performance on CSR (Lamoreux, 1987, Consolandi et al., 2009). Persistently included firms have made substantial financial and strategic investments in sustainability (Artiach et al., 2010). By contrast, removal of a firm indicates a loss of certified status on CSR excellence. Approximately 4500 firms are invited each year to participate in the corporate sustainability assessment of SAM (S&P Global), 2020). The SAM group is an independent asset management company, evaluating the opportunities and risks associated with firms' economic, environmental and social development (Artiach et al., 2010). The DJSI represents the 10% best performing companies on sustainability per industry, based on elaborate assessment criteria. Therefore, it is essential to control for industry effects, discussed in section 3.1.3. The DJSI is considerably one of the most reliable available indices and is therefore commonly applied (e.g. Lopez, Garcia & Rodriguez, 2007; Consolandi et al., 2009; Artiach et al., 2010). The excellent reputation of the SAM group is widely endorsed and recommended as one of the best practices in the field of sustainability research (by Beleo, Scherer and Knöpfel 2004). Recently, S&P Global launched new indices like the S&P ESG Index, ranking relative absolute performance (2020). Unfortunately, these indices are not useful since they provide a limited number of observations.

Table 1: Variable overview

$$Model: \ PR_{i,t} = \alpha_i + \beta_1 Sust_{i,t} + \beta_2 TAssets_{i,t} + \beta_3 Lev_{i,t} + \beta_4 Stockcomp_{i,t} + \beta_5 D\_industry_i + \beta_6 D\_year_t + \varepsilon_{i,t}$$

	Variable	Description	Source
Dependent variable (PR)	ROA	ROA is calculated by dividing net income by total assets.	Compustat
	ROE	ROE is calculated by dividing net income by shareholder equity. Shareholders equity is defined as total assets minus total liabilities.	Compustat
	ROS	ROA is calculated by dividing net income by total sales.	Compustat
Independent variable	CSR performance (Sust)	The independent variable is a dummy, indicating whether a firm is included consistently in the Dow Jones Sustainability Index between 2014-2019.	S&P Global
Control variables	Firm size (TAssets)	This variable is measured by total assets.	Compustat
	Leverage (Lev)	The exposure to risk is measured by dividing total debt by total shareholder equity.	Compustat
	Stock Compensation (StockComp)	This variable is measured by average total stock compensation per firm per year.	Execucomp
	Industry	A dummy based on Standard Industrial Classification code (SIC), derived from OSHA.	Compustat
	Year	A dummy variable for each year in the dataset between 2014-2019	Compustat

Table 1 provides an overview of the variables used in the main model. The table presents the function of the variable, a short description and the data source.

3.1.3 CONTROL VARIABLES

An OLS regression assumes exogeneity of the variable of interest, implying that sustainability has to be uncorrelated with the error term (Stock & Watson, 2007). Consequently, to assess the actual effect of sustainability, multiple firm characteristics with potential explanatory value need to be included. The included control variables are expected to be correlated with the main variable and to affect corporate performance. To account for omitted variable bias, the following control variables will be included in the regression: size, leverage, stock compensation and fixed effects (FE) for industry and year. Next, these variables will be shortly discussed.

According to the existing literature, one of the most important determinants of corporate value and CSR participation is captured by the size of the company. In line with the slack resource theory, larger firms are more likely to invest in socially committed activities as a result of better financial performance (Waddock & Gravers, 1997). Large firms find themselves in the privileged position to invest in ESG factors rather than purely focusing on profitability. Due to a larger scale of operating, better resource access and greater visibility, larger firms are more likely to engage in environmental and social activities than small and medium enterprises (e.g. Perrini, Russo & Tencati, 2007; Udayasankar, 2008). Total assets will be taken as proxy to reflect size of the company (e.g. Chen & Chen, 2011).

Although Modigliani & Miller (1958) suggested that firm's value is independent of capital structure in a frictionless market, more recent studies concluded differently (e.g. Myers, 1984; Graham & Harvey, 2001). Both the trade-off and pecking-order theory describe decisions regarding capital structure that might affect the value of the firm (Myers, 2001; Palia, 2001). Firms with favorable growth opportunities are likely to target lower debt-to-equity ratios (Smith & Watts, 1992). In contrast, limited growth opportunities should operate at high debt levels to restrain excess cash and overinvestment (Myers, 2003). As a result, established and mature firms are expected to show better financial results, while smaller and developing firms are more dependent on their future growth. This suggests a positive relationship between leverage and corporate performance. Furthermore, sustainable operations decrease CSR-related risk. Sustainable firms are less vulnerable to risk from lawsuits and fines that could impact their reputation and strategic opportunities (McGuire et al., 1988). The exposure to risk is reflected via leverage and calculated by dividing total debt by total equity. Total equity is defined as shareholder equity, determined by total assets minus total liabilities.

Recently, academics have started to investigate the relation between sustainability and executive compensation. Companies incorporate ESG-related objectives into their renumeration structure to affect managerial motivation (Gillan et al., 2010). ESG-related executive compensation increases CSR engagement and could improve corporate performance (Flammer et al., 2019). Others found a bidimensional relationship between ESG-related compensation and sustainability (Jo & Harjoto, 2011). Moreover, companies employ stock compensation to overcome the principal-agent problem. This creates shared interest for board members and shareholders that could affect corporate performance (Jensen, 1986; Eisenhardt, 1989). Stock compensation repositions the attention to short run profitability (Mehran, 1995). The majority of the CEO's would turn down a profitable investment, in order to execute share-repurchases (Almeida, Fos & Kronlund, 2016). This artificially increases earnings per share (EPS) at the expense of organic value creation in the long run (Farre-Mensa, Michaely & Schmalz, 2014). This study combines two formerly separated topics by including an interaction term between sustainability and stock compensation. The effect of stock compensation on profitability might differ among sustainable and conventional companies. Sustainable companies might pay higher compensation due to achievement of ESG objectives. This could reinforce the positive effect on profitability. The firm-year average stock compensation is obtained via Execucomp.

Finally, the model is extended with industry- and year-fixed effects. As described in section 3.1.2, the DJSI include the 10% most sustainable companies of each industry. There is a big difference among industries to what extent they are integrating sustainable operations. For example, the oil and gas industry faces enormous challenges regarding the sustainable future (George et al., 2016). The entire world, ranging from packaging to driving cars is heavily reliant on this industry. Alternatives such as solar and wind energy, ethanol and nuclear power are not ready yet to replace fossil fuels (Balzani & Armaroli, 2010). This constitutes a strange contradiction. On the one hand, companies as ExxonMobil try to divest the most polluting operations, but on the other hand they start new oil drilling programs to meet the increasing demand (Silvestre & Gimenes, 2017). Although firms acknowledge the relevance of negative externalities, most industries are still too valuable to start divesting on large scale. This contradiction is perfectly illustrated by the recent IPO of Saudi Aramco with a target company value of $2 trillion, resulting in the largest publicly listed company in the world (Forbes, 2019). To control for differences between industries, dummy variables are included in the model. The industries are categorized based on Standard Industrial Classification (SIC), derived from OSHA. The companies are divided into the following industries: mining (1000-1499), construction (1500-1799), manufacturing (2000-3999), transportation, communications, electric, gas and sanitary (4000-4999), wholesale trade (5000-5199), retail trade (5200-5999), finance, insurance and real estate (6000-6799), services (7000-8999) and nonclassifiable (9900-9999), presented in appendix A table 6. Lastly, year-fixed effects are included to control for macroeconomic factors that could potentially impact the relation between sustainability and corporate performance.

3.2 Sample selection and data collection

As described in section 2.1 and 2.4.3, the field of corporate sustainability is rapidly evolving. This could have substantial implications for the results of this study. By composing the dataset, one should find a balance between relevant current data and the need for sufficient observations. A time period of 2014 up to 2019 was chosen, because this period provides enough observations and covers relevant recent years. Moreover, one of the major concerns in sustainability studies is sampling (McGuire et al., 1988; Margolis & Walsh, 2003). The construction of a reliable sample for Europe highly sensitive to bias (Lo & Sheu, 2007). Therefore, it was not feasible to construct a reliable dataset for Europe during this short period and this study focuses on the S&P 500. The large number of companies contributes to the accuracy of this study. Additionally, concerns regarding different accounting procedures were mentioned in section 2.3.1. To solve this problem, only firms with the domestic accounting standard US GAAP were included in the dataset. Furthermore, firms needed to be included in the S&P 500 continuously between 2014 and 2019 and sustainable companies also needed to be included persistently in DJSI. Therefore, included sustainable companies are the best performers with respect to sustainability and this sample is most likely to show the potential impact of sustainability on profitability. After elimination of missing variables, the dataset contains 2016 firm-year observations. In total, 336 firms have been selected with 6 observations per firm each.

The composed dataset consists of three parts, Compustat, Execucomp and the Dow Jones Sustainability Index. The financials of the firms in the S&P 500 were derived from the North America dataset of Compustat. Execucomp was used to derive data concerning executive compensation. Per board member, stock-based compensation was provided and transformed into a firm-year average. Finally, the independent variable was derived from a publicly accessible document with historical annual reports of the DJSI (S&P Global, 2020).

3.3 VARIABLE TRANSFORMATION

Histograms of the original variables clearly show a pattern of non-normal distribution (appendix A). The majority of observations is concentrated in the center, but most variables suffer from extreme outliers. This could be caused by the process of manually balancing the dataset. Outliers are observations that strongly deviate from the majority of the observations. The outliers influence the data heavily, resulting in skewness and kurtosis (Stock & Watson, 2007). Skewness shows the symmetry of a variable and kurtosis indicates the weight of the tail, whether large of small. In order to assume normal distribution, skewness and kurtosis range from approximately -3 and 3 (DeCarlo, 1997).

This study considered four different scenarios, namely the original variables, winsorizing at 1%-99%, 5%-95% and eventually the best option at 10%-90%. The non-normal distribution of the original variables is confirmed by the large numbers for kurtosis and skewness, presented in table 2 below. OLS estimators are heavily influenced when the assumptions are not met and therefore adjustments have to be made. To overcome large outliers, three different levels of winsorizing have been examined. The first scenario concerns winsorizing at 1% and 99%, implying that most extreme outliers are replaced by the 1st and 99th percentile. Both kurtosis and skewness are strongly reduced. For example, kurtosis of total assets was reduced from 129.7 to 26.3, but still far away from the desired -3 and 3 (DeCarlo, 1997). Winsorizing at 5% and 95% level tends towards a normal distribution but not enough yet. Skewness for all variables is reduced below 2.15 but heavy tails are still a concern. Eventually, the variables approach the acceptable threshold of -3 and 3 when winsorizing at 10% and 90%. The problem of kurtosis is difficult to solve completely since winsorizing replaces extreme outliers and gives them the value of the cut level. This automatically generates some heavier tails than strictly normal as visible in appendix A. The most extreme kurtosis is 3.40 for total assets.

An alternative to winsorizing is truncating but this method results in the loss of many observations. This approach would have had large implications for the balanced dataset since all companies had to be included consistently. The other option relates to the logarithm. Large outliers will be corrected stronger than smaller values. However, the major downside of a logarithm is related to its property. A logarithm is only defined for values $x \geq 1$ and net income contains both negative and positive numbers. Therefore, this transformation is not applicable to most of these variables.

Table 2: Skewness and kurtosis of the four evaluated scenarios of transformed variables

	Original variable		**Winsorizing 1%-99%**		**Wins. 5%-95%**		**Wins. 10%-90%**	
Variable	**Skewness**	**Kurtosis**	**Skewness**	**Kurtosis**	**Skewness**	**Kurtosis**	**Skewness**	**Kurtosis**
Assets	10.01	129.70	4.53	26.31	2.15	6.83	1.31	3.40
Leverage	-9.54	536.80	3.80	28.42	2.02	6.49	1.10	3.10
Net Income	7.77	98.51	3.50	18.89	1.76	5.35	1.21	3.20
ROA	-8.14	165.87	0.66	6.11	0.33	2.60	0.32	1.99
ROE	24.30	829.44	2.32	22.66	0.45	4.34	0.35	2.30
ROS	-6.05	95.70	-1.82	12.07	0.24	2.96	0.40	2.13
Stock Comp	44.85	2013.05	0.56	4.90	0.21	2.97	0.01	2.33

Table 2 presents the skewness and kurtosis values of the four evaluated scenarios of transformed variables. According to DeCarlo (1997), the values need to approach -3 and 3 in order to assume a normal distribution. These values are derived from the complete sample of 2016 observations.

4 METHODOLOGY

This section covers the research design to investigate the hypotheses stated in section 2. First, the univariate analysis will be shortly discussed (section 4.1) and then the multivariate analysis (section 4.2). The multivariate analysis is split up into method specification (4.2.1) and model specification (4.2.2).

4.1 UNIVARIATE ANALYSIS

To examine the differences between sustainable and conventional companies, a univariate analysis has been performed. The univariate analysis consists of two parts. First, the descriptive statistics of the variables are provided. Secondly, both a parametric and non-parametric test have been executed. The independent Welch t-test provides an alternative to the student t-test and performs better in case of unequal variance and different sample sizes (Ruxton, 2006). Though, in order to justify the execution of a t-test, normal distribution is required. As described in section 3.3, winsorizing at 10% and 90% reduced kurtosis below 3.4. In order to assume normal distribution, kurtosis and skewness need to be below 3 (DeCarlo, 1997). Since not all variables strictly comply with normal distribution, the non-parametric Mann-Whitney U has been performed as well. In contrast to a t-test, the Mann-Whitney U test does not require a specific distribution. The null hypothesis states that both samples follow the same distribution and therefore both populations are equal (Mann & Whitney, 1947). This approach is more robust to outliers since it assigns a rank, rather than taking into account absolute values.

4.2 MULTIVARIATE ANALYSIS

4.2.1 METHOD SPECIFICATION

The main analysis to examine the impact of sustainability on corporate performance consists of multiple OLS regressions. The most important assumption relates to exogeneity, implying that the error term has to be uncorrelated with the variable of interest. Other problems like heterogeneity and absence of correlation are not crucial for the analysis but increase power. Fixed effects (FE) or random effects (RE) are widely used to relieve endogeneity issues in longitudinal studies. The Breusch-Pagan Lagrange Multiplier test has been performed to conclude whether to take RE and FE into account or not (Breusch & Pagan, 1980). The p-values of 0.000 suggest that the models suffer from either RE or FE and the model needs to control for these effects (table 1 appendix B). Usually, a Hausmann test is executed to point out whether RE or FE need to be used. These models remove time-invariant factors but a RE model has stricter assumptions. However, the main variable of this study concerns a constant dummy since the dataset is manually balanced. As a result, the Hausmann test isn't useful. Therefore, the OLS regressions take into account fixed industry and time effects. For the industries mentioned in section 3.1.3 and the years 2014 up to 2019, a dummy variable has been added. This removes confounding factors and isolates the impact of sustainability on profitability.

4.2.2 MODEL SPECIFICATION

Three different approaches have been applied to examine the first hypothesis (1): "Sustainable operations increase corporate profitability". First, model (1a) has been executed and next, this model has been extended by including the interaction term between sustainability and stock compensation (1b). This extension shows whether stock compensation has predictive value on profitability and whether the effect differs for sustainable and conventional companies. Finally, to check the robustness of the findings, and solve potential simultaneous causality, the explanatory variables have been lagged by one year (1c).

$$(1a)\ \ PR_{i,t} = \alpha_i + \beta_1 Sust_{i,t} + \beta_2 TAssets_{i,t} + \beta_3 Lev_{i,t} + \beta_4 D\_industry_i + \beta_5 D\_year_t + \varepsilon_{i,t}$$

$$(1b)\ \ PR_{i,t} = \alpha_i + \beta_1 Sust_{i,t} + \beta_2 TAssets_{i,t} + \beta_3 Lev_{i,t} + \beta_4 (Sust_{i,t} * Stockcomp_{i,t}) + \beta_5 D\_industry_i + \beta_6 D\_year_t + \varepsilon_{i,t}$$

$$(1c)\ \ PR_{i,t} = \alpha_i + \beta_1 Sust_{i,t-1} + \beta_2 TAssets_{i,t-1} + \beta_3 Lev_{i,t-1} + \beta_4 (Sust_{i,t-1} * Stockcomp_{i,t-1}) + \beta_5 D\_industry_i + \beta_6 D\_year_t + \varepsilon_{i,t}$$

According to the integrative theory, the following hypothesis has been formulated (2): "The impact of sustainability on corporate profitability increases over time". In order to investigate this hypothesis, model (1a) has been performed for two different time periods. The entire sample covering 2014-2019 was split up into two periods, 2014-2016 and 2017-2019, to observe whether the impact differs over time. Additionally, to investigate a potential trend, model (1a) has been extended with an interaction-effect between sustainability and years (2a).

$$(2a)\ \ PR_{i,t} = \alpha_i + \beta_1 Sust_{i,t} + \beta_2 (Sust_{i,t} * year_t) + \beta_3 TAssets_{i,t} + \ \beta_4 Lev_{i,t} \\ + \ \beta_5 D\_industry_i + \ \beta_6 D\_year_t + \ \varepsilon_{i,t}$$

Furthermore, some studies suggested reversed causality. Therefore hypothesis (3): "Higher profitability positively influences CSR engagement" has been tested via linear probability models. Simply stated, the independent and dependent variables are switched (3a) in comparison to the main model. Again, to approach the robustness of the test, lagged variables are included (3b).

$$(3a)\ \ Sust_{i,t} = \alpha_i + \beta_1 PR_{i,t} + \beta_2 TAssets_{i,t} + \ \beta_3 Lev_{i,t} + \ \ \beta_4 D\_industry_i + \ \beta_5 D\_year_t \\ + \ \varepsilon_{i,t}$$

$$(3b)\ \ Sust_{i,t} = \alpha_i + \beta_1 PR_{i,t-1} + \beta_2 TAssets_{i,t-1} + \ \beta_3 Lev_{i,t-1} + \ \beta_4 D\_industry_i \\ + \ \beta_5 D\_year_t + \ \varepsilon_{i,t}$$

At last, correlation in error terms causes bias in the OLS estimators. Without adjusting for these correlations, standard errors are strongly underestimated and therefore induce incorrect inferences. Error terms are most likely correlated within companies rather than between companies. This allows observations of the same company to be correlated over time but not correlated to other companies. To take the within-group variation into account, ε_i has been decomposed as shown in equation (4).

$$(4)\ \varepsilon_{i,t} = f(Company) + idiosyncratic\ shock$$

5 RESULTS

The univariate analysis will be discussed in section 5.1 and the multivariate analysis in section 5.2. The results for each of the three hypotheses are provided separately. First, the impact of sustainability on profitability will be discussed (section 5.2.1), then differences over time (section 5.2.2) and finally reversed causality (section 5.2.3).

5.1 UNIVARIATE ANALYSIS

This section covers the univariate analysis, meaning that the variables are be investigated separately. First, descriptive statistics and the differences due to winsorizing are discussed (section 5.1.1). Subsequently, a Welch t-test and Mann Whitney U-test have been performed to assess the differences between sustainable and conventional firms (section 5.1.2).

5.1.1 DESCRIPTIVE STATISTICS

As mentioned above, three different levels of winorizing variables have been examined. Winsorizing variables can have substantial implications for the summary statistics. To clearly present the consequences, the descriptive statistics are presented for the original and winsorized variables, cut at 10% and 90% level in table 3 below. The upper table provides the descriptive statistics of the entire sample (336 firms) with 6 observations each. Moreover, the total sample is split up in sustainable firms (N=45) and conventional firms (N=291). The tables present the mean, standard deviation, minimum, maximum, skewness and kurtosis. The variable sustainability has been excluded since the dummy variable simply categorizes the data, and therefore descriptive statistics are not very informative.

When transforming variables, it is informative to examine the consequences. Winsorizing at 10% and 90% means that 20% of the dataset is considered an outlier. This has huge consequences. The average stock compensation differs enormously and is reduced from 289.000 to 149.000 dollar per year, ranging from 45.000 to 250.000. Moreover, the average company size almost halves to 23.4 million, ranging from 3.1 to 78 million. The major decrease in standard deviations for these variables indicate that the higher mean was caused by large outliers. Furthermore, the ROA does not change (0.06), the average ROE drops from 0.27 to 0.16 and ROS is the only variable that increases its mean from 0.10 to 0.11. An increasement suggests that initial values around 0 or lower did pressure the mean downwards.

Table 3: Descriptive statistics of original and winsorized variables at 10% and 90% level

Original variables

Entire sample	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total	2016	41485.72	127042.24	11.95	1951158.00	10.01	129.70
Leverage	2016	1.10	25.40	-776.59	421.73	-9.54	536.80
Net Income	2016	1563.06	4587.27	-23119.00	81417.00	7.77	98.51
Return on Assets	2016	0.06	0.10	-2.28	0.53	-8.14	165.87
Return on Equity	2016	0.27	4.08	-40.84	143.59	24.30	829.44
Return on Sales	2016	0.10	0.24	-3.84	1.90	-6.05	95.70
Stock Compensation	2016	289.33	6136.17	0.00	275633.44	44.85	2013.05
N	2016						

Sustainable firms	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total	270	95651.58	271377.39	2057.00	1951158.00	6.03	39.17
Leverage	270	2.37	25.35	-149.25	383.53	11.88	195.55
Net Income	270	3256.69	4788.12	-6798.00	39240.00	2.84	16.56
Return on Assets	270	0.07	0.06	0.21	0.33	0.43	6.24
Return on Equity	270	0.80	9.01	-31.45	143.59	14.65	235.69
Return on Sales	270	0.11	0.16	-1.29	0.58	-2.76	28.06
Stock Compensation	270	164.46	58.03	0.00	390.42	0.39	5.07
N	270						

Conventional firms	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total	1746	33109.55	82219.23	11.95	896552.00	6.24	49.47
Leverage	1746	0.90	25.41	-776.59	421.73	-12.82	588.47
Net Income	1746	1301.16	4500.26	-23119.00	81417.00	8.94	120.67
Return on Assets	1746	0.06	0.11	-2.28	0.53	-8.24	160.48
Return on Equity	1746	0.19	2.58	-40.84	78.33	13.99	534.66
Return on Sales	1746	0.10	0.25	-3.84	1.90	-6.03	92.37
Stock Compensation	1746	308.64	6593.57	0.00	275633.44	41.74	1743.22
N	1746						

Winsorized variables : 10% and 90' level

Entire sample	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total_w	2016	23427.28	23974.79	3137.54	77987.00	1.31	3.40
Leverage_w	2016	0.92	0.82	0.03	2.71	1.10	3.10
Net Income_w	2016	1089.70	1166.51	-48.48	3692.00	1.21	3.20
Return on Assets_w	2016	0.06	0.05	0.00	0.14	0.32	1.99
Return on Equity_w	2016	0.16	0.14	0.04	0.41	0.35	2.30
Return on Sales_w	2016	0.11	0.08	0.01	0.27	0.40	2.13
Stock Compensation_w	2016	148.79	59.50	44.73	249.97	0.01	2.33
N	2016						

Sustainable firms	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total_w	270	41066.31	27676.68	3137.54	77987.00	0.23	1.41
Leverage_w	270	1.00	0.84	0.03	2.71	1.14	2.87
Net Income_w	270	1969.77	1429.39	-48.48	3692.00	0.05	1.38
Return on Assets_w	270	0.06	0.05	0.00	0.14	0.33	2.07
Return on Equity_w	270	0.18	0.15	0.04	0.41	0.39	2.00
Return on Sales_w	270	0.11	0.08	0.01	0.27	0.53	2.29
Stock Compensation_w	270	164.77	48.21	44.73	249.97	0.24	3.13
N	270						

Conventional firms	**Count**	**Mean**	**SD**	**Min**	**Max**	**Skewness**	**Kurtosis**
Assets Total_w	1746	20699.60	22137.26	3137.54	77987.00	1.58	4.35
Leverage_w	1746	0.90	0.82	0.03	2.71	1.10	3.13
Net Income_w	1746	953.61	1057.33	-48.48	3692.00	1.45	4.12
Return on Assets_w	1746	0.06	0.05	0.00	0.14	0.32	1.98
Return on Equity_w	1746	0.16	0.13	0.04	0.41	0.34	2.34
Return on Sales_w	1746	0.11	0.09	0.01	0.27	0.38	2.10
Stock Compensation_w	1746	146.32	60.69	44.73	249.97	0.05	2.27
N	1746						

Table 3 presents the descriptive statistics of the original and winsorized variables at 10% and 90% level. The first table concerns the entire sample, the second sustainable firms and the third conventional firms. The table displays the mean, standard error, minimum, maximum, skewness and kurtosis.

Next, the differences between the two samples will be examined. The mean of financial ratios ROA and ROS (0.06 and 0.11) are equal for sustainable and conventional firms and only ROE differs (0.18 versus 0.16). This indicates that profitability ratios between the two samples hardly differ. Due to winsorizing, the minimum of the ROA, ROE and ROS is raised to positive numbers only. This means that at a maximum of 10% of the firms showed negative financial ratios. Notably, due to winsorizing, the mean of stock compensation becomes higher for sustainable companies while the initial mean for conventional firms was almost twice as large. The average debt-to-equity ratio is slightly higher for sustainable firms 1.00 versus 0.90 and ranges from 0.03, to almost 3. Finally, total assets and net income of sustainable companies are twice as large as the mean for conventional firms.

5.1.1 WELCH T-TEST AND MANN WHITNEY U-TEST

Table 4 provides the test-statistics of the Welch t-test and the Whitney-Mann U-test. The first test operates an indicator for equal means and the second test constitutes the confirmation. Both tests confirm that size, net income and stock compensation differ significantly across sustainable and conventional companies (1% level). Furthermore, at 5% significance level, leverage of sustainable and conventional firms tends to represent different populations, although the mean only differs significantly at 10%. The results of the dependent variables suggest that only the mean of ROE might differ between the two samples. The Whitney-Mann U-test suggests that ROA, ROE and ROS are all retrieved from the same population and therefore not likely to differ between sustainable and conventional firms.

Table 4: Welch t-test and Whitney Mann U-test

	Welch t-test		**Whitney Mann U-test**	
Variable	**T-value**	**P-value**	**Z-value**	**P-value2**
Assets Total_w	11.535***	<0.001	12.631***	<0.001
Leverage_w	1.786*	0.032	2.147**	0.075
Net Income_w	11.217***	<0.001	10.933***	<0.001
Return on Assets_w	0.272	0.653	0.450	0.786
Return on Equity_w	1.943*	0.193	1.301	0.053
Return on Sales_w	-0.315	0.799	-0.254	0.753
Stock Compensation_w	5.637***	<0.001	5.036***	<0.001

Table 4 presents test statistics of the parametric Welch t-test and non-parametric Whitney Mann U-test. The asterisks indicate the significance level: * p<0.10, ** p<0.05, *** p<0.01.

Lastly, table 6 in appendix B shows the distribution of the industries. The categories are organized based on SIC code. Almost half of the firms included in the dataset are manufacturing firms. Finance, insurance and real estate related companies reflect 18% and services-related companies 14%. The differences among industries will be discussed in section 5.2.1.

5.2 Multivariate Regression

5.2.1 Main regression results

The actual impact of sustainability on profitability has been assessed via multiple OLS regressions. Table 5 presents the results of model (1a) and (1b) as described in the methodology (Section 4.2.2). These regressions have been executed on dependent variables ROA, ROE and ROS and therefore table 5 contains 3 different columns per regression. The table also shows the outcomes for the industry and year. Their impact will be only discussed in this section. The rest of this study takes the FE into account but will not present them in the tables.

Regressions 1-3 follow the mainstream theory to only control for size, leverage and fixed effects (e.g. Aras et al., 2010). Additionally, regressions (4-6) include stock compensation itself and the interaction term with sustainability as control variables according to section 3.1.3. For regressions (1-3), R-squared ranges from 0.127 to 0.206. The R-squared statistic presents the part of the dependent variable's variance, explained by the model (Stock & Watson, 2007). As expected, the R-squared is the highest for ROA, since the model controls for size via total assets and hence is an important determinant for ROA. The regression explains 20.6% of the ROA variance. As adding variables will most likely increase R-squared, the adjusted R-squared is a more appropriate test statistic. This alternative statistic corrects for adding variables that does not add substantial explanatory value (Stock & Watson, 2007). Regressions (4-6) share almost the same adjusted R-squared statistics as (1-3), implying that the interaction term between stock compensation and sustainability does not add explanatory power to the model. Moreover, all coefficients of the interaction terms are insignificant. This contradicts the agency theory that stock compensation increases profitability and that the effect might differ among sustainable and conventional companies. Based on regressions (4-6), there is no reason to include the interaction effect as explanator of profitability. The insignificant interaction term probably only adds noise to the model, affecting the coefficients of ROA, ROE and ROS in regressions (4-6). Therefore, these results are not discussed, and the interaction term have not been taken into account during the remainder of this study.

Regressions (1-3) in table 5 suggest there is no evidence that sustainable operations increase corporate profitability, contradicting hypothesis (1). The coefficients of sustainability are positive but most importantly insignificant. Moreover, the control variable total assets is significant for ROA (at 1%), but not for ROE and ROS. A rise of 1 million assets, increases ROA with 0.005. The explanatory value for ROA is self-evident since it is calculated by dividing net income by total assets. Yet, the insignificance of firm size for ROE and ROS denies the expected relationship of larger firms showing higher profitability. Additionally, leverage is negatively correlated with ROA and ROS at 1% significance level, implying that higher debt-to-equity ratios lead to worse corporate performance. This contradicts the expectation that highly leveraged firms with low growth opportunities show higher profitability ratios. Nonetheless, leverage is positively related to ROE. When the debt-to-equity ratio increases by 1, ROE increases with 0.051. Most likely, this is caused by the boost ROE gets when leverage increases. If debt increases, shareholders equity decreases, since it is calculated by total assets minus total liabilities. Therefore, ROE gets a boost because shareholders equity is the denominator in ROE. Lastly, the constant in this study will not be interpreted since a valid explanation fails.

Furthermore, the time and industry effects in regression (1-3) will be discussed shortly. The reference group is the mining industry and dummies are included to control for other industries. Therefore, conclusions have to be drawn in comparison to the mining industry. Large differences between industries can be detected. All other industries show significantly higher ROA ratios than the mining industry. Wholesale and retail trade show the highest ratios with improvements of 0.052 and 0.067 on a scale of 0.00 to 0.14. These rankings might be explained by the relatively small amount of assets at trade companies. Moreover, the other companies have significantly higher ROE ratios, except for the unclassifiable group. Again, the wholesale and retail companies show the highest coefficients with 0.17 and 0.13. These are major improvements given the scale or ROE, ranging from 0.04 to 0.41. Finance, insurance and real estate achieve the highest ROS ratios. Their ratios are on average 0.09 higher than for mining, ranging from 0.01-0.27. Lastly, the years 2015 and 2016 show significantly lower profitability ratios than achieved in 2014 (at 5% level). In 2017, the ROE was also significantly lower. The other years did not significantly impact the profitability ratios.

Table 5: Main regression results on positive relationship of sustainability and profitability

	(1) ROA_w	(2) ROE_W	(3) ROS_w	(4) ROA_w	(5) ROE_w	(6) ROS_w
Sustainability	0.009	0.018	0.003	0.030*	0.099*	0.023
	(0.006)	(0.016)	(0.011)	(0.018)	(0.051)	(0.032)
Total Assets_w	-0.000***	0.000	0.000	-0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage_w	-0.009***	0.051***	-0.013***	-0.010***	0.050***	-0.013***
	(0.002)	(0.008)	(0.004)	(0.002)	(0.008)	(0.004)
Stock Comp_w				0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Sust*Stock Comp_w				0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
Industry						
Construction	0.038**	0.111**	0.021	0.039**	0.112**	0.019
	(0.017)	(0.043)	(0.014)	(0.017)	(0.044)	(0.015)
Manufacturing	0.046***	0.118***	0.034***	0.046***	0.118***	0.035***
	(0.005)	(0.013)	(0.009)	(0.005)	(0.013)	(0.009)
Transportation	0.046***	0.118***	0.034**	0.047***	0.120***	0.036**
	(0.008)	(0.025)	(0.014)	(0.008)	(0.025)	(0.014)
Wholesale Trade	0.052***	0.171***	0.003	0.053***	0.173***	0.001
	(0.012)	(0.025)	(0.023)	(0.012)	(0.026)	(0.024)
Retail Trade	0.067***	0.134***	0.000	0.068***	0.139***	0.000
	(0.011)	(0.031)	(0.018)	(0.012)	(0.032)	(0.019)
Finance	0.021***	0.068***	0.094***	0.021***	0.069***	0.096***
	(0.006)	(0.015)	(0.013)	(0.006)	(0.016)	(0.013)
Services	0.040***	0.106***	0.038***	0.040***	0.107***	0.038***
	(0.006)	(0.020)	(0.012)	(0.006)	(0.020)	(0.012)
Nonclassifiable	0.046***	0.076	0.029	0.048***	0.078	0.034
	(0.015)	(0.076)	(0.024)	(0.016)	(0.078)	(0.027)
Year						
2015	-0.005***	-0.018***	-0.011***	-0.005***	-0.018***	-0.011***
	(0.002)	(0.006)	(0.004)	(0.002)	(0.006)	(0.004)
2016	-0.006***	-0.019***	-0.010***	-0.006***	-0.018***	-0.011***
	(0.002)	(0.006)	(0.004)	(0.002)	(0.006)	(0.004)
2017	0.003	-0.017**	0.001	0.003	-0.016**	0.002
	(0.002)	(0.007)	(0.005)	(0.002)	(0.007)	(0.005)
2018	0.004	0.005	0.008*	0.004	0.006	0.007
	(0.003)	(0.008)	(0.005)	(0.003)	(0.008)	(0.005)
2019	0.001	0.010	0.008*	0.001	0.009	0.007
	(0.003)	(0.008)	(0.005)	(0.003)	(0.008)	(0.005)
Constant	0.045***	0.031**	0.091***	0.042***	0.026	0.081***
	(0.004)	(0.013)	(0.008)	(0.006)	(0.019)	(0.011)
R-squared	0.206	0.188	0.127	0.206	0.188	0.128
Adj R-squared	0.200	0.181	0.120	0.199	0.181	0.121

Table 5 shows the output of six OLS regressions with respect to the first hypothesis. The dependent variables are ROA, ROE and ROS and calculated by dividing net income by respectively total assets, shareholder equity and total sales. Regressions (1-3) show the results with the interaction term between sustainability and stock compensation excluded and (4-6) included. The variable of interest is sustainability with total assets, leverage, interaction term between sustainability and stock compensation, industry and year dummies as control variables. Clustered standard errors are shown in parenthesis. The asterisks indicate significance level: * p<0.10, ** p<0.05, *** p<0.01.

To test the robustness of the regression, the explanatory variables were lagged by one year. As a consequence, the number of observations drops from 2016 to 1680. Table 1 in appendix C shows that both R-squared and the adjusted R-squared decrease for ROA and ROE, suggesting lower explanatory power. Again, the insignificant coefficients of sustainability do not provide evidence for the positive impact on corporate performance. In general, the outcomes of the lagged variables comply with the performed regressions (1-3) in table 5. As mentioned above, the results of regressions (4-6) will not be further discussed.

To examine the internal validity of the regressions, several tests have been conducted to test for potential multicollinearity, heteroskedasticity and autocorrelation. Perfect multicollinearity exists when two variables show a correlation of 1. The correlation matrix table 3 in appendix B provides an indicator for multicollinear relations. The results suggest there's no reason to fear perfect multicollinearity since the highest correlation is only 0.673 between total assets and net income, suggesting higher net income for larger firms. Additionally, a variance-inflator (VIF) test has been conducted to test for multicollinearity (table 4 in appendix B). A correlation matrix only observes direct relationships, while a VIF-test also takes indirect relationships into account (O'brien, 2007). Academics assume that outcomes above 10 imply severe multicollinearity (e.g. Akinwande, Dikko & Samson, 2015). However, the highest value is 4.09 for the relation between sustainability and total assets, not being close to the threshold of 10. Hence, the models do not suffer from multicollinearity.

Next, heteroskedasticity will be investigated. If a variable suffers from non-constant variance, OLS estimators are no longer efficient (Stock & Watson, 2007). Therefore, homoskedasticity is required for OLS estimators to be best linear unbiased estimators (BLUE). To detect potential heteroskedasticity, a Breusch-Pagan test is performed (table 5 in appendix B). Three different regressions have been tested for respectively ROA, ROE and ROS as dependent variables. ROA and ROE clearly suffer from heteroskedasticity with p-values smaller than 0.001. Heteroskedasticity could be caused by events or traits that do not affect observations individually, but affecting clusters of observations (Sarzosa, 2012). To solve heteroskedasticity, error terms clustered by companies have been included in the model (Cameron & Miller, 2015). Furthermore, there's no indication that ROS suffers from non-constant variance.

Lastly, in longitudinal studies error-terms of different observations might be correlated. This causes OLS estimators to be biased and inefficient. A Wooldridge test for autocorrelation in panel data is executed on the three dependent financial ratios (Wooldridge, 2010). The results of the F-test indicate autocorrelation for ROA, ROE and ROS with a p-value smaller than 0.001 (table 2 in appendix B). Just like heteroskedasticity, this problem is solved by including robust clustered standard errors (Vogelsang, 2012).

5.2.2 IMPACT ON DIFFERENT TIME PERIODS

Table 6 shows the regression for the two sub periods, 2014-2016 (1-3) and 2017-2019 (4-6). First, the increased (adjusted) R-squared for the three regressions catches the attention in regressions (1-3). For ROA, the adjusted R-squared increases from 0.200 to 0.256. This implies that the independent variables explain 25.6% of the variance of ROA. In contrast, for the period 2017-2019 the adjusted R-squared drops from 0.200 to 0.150. So, explanatory power increases for 2014-2016 and decreases for the second period. This provides a first indication that there might be substantial differences between the two time periods.

For the period 2014-2016, sustainability tends to have a significant positive effect on ROA and ROE, under 5% and 10% significance level. Sustainability increases ROA and ROE respectively with 0.013 and 0.030. Given the scales of ROA (0-0.14) and ROE (0.04-0.41), these coefficients imply substantial improvements (table 3 in section 5.1.1). In contrast, regressions (4-6) show insignificant results for sustainability. These findings have important implications for this study. Time periods tend to play a decisive role. The outcomes of regressions (1-6) indicate that the impact of sustainability on corporate profitability decreases or even diminishes over time. At first, companies were able to obtain competitive advantage by engaging in CSR (Porter & Kramer, 2006). Part of this increased profitability between 2014-2016 might be caused by higher consciousness concerning societal and environmental issues in combination with the increased willingness-to-pay. However, the cause of the decrease in impact is more difficult to explain.

On the one hand, this might be in line with the integrative theory. Implying that sustainable operations might change standards in society fundamentally and eventually could result in the creation of a new normal (Hawkes, 2001). The establishment of the new normal could explain why the impact of sustainability declines. Customers might take sustainable products and services for granted and are no longer willing to pay a price premium anymore. However, this scenario is not plausible since increased consciousness on social issues has only just begun (section 2.4.3). Another explanation might be the start of a new era since firms cannot ignore the public debate regarding sustainability anymore. Between 2015 and 2017, global investments in CSR surged 25% to $23 trillion (Bloomberg, 2017). In comparison to 2012, the US tripled their sustainable investments in 2018, making them the biggest investors after Europe (GSIA, 2019; Visual Capitalist, 2020). The rise in socially responsible investing (SRI) offers companies opportunities to adapt in a profitable way. Moreover, 64% of the CEO's worldwide claimed that they were increasing CSR-related investments substantially (PwC, 2016). These studies indicate an explosion in sustainable investments, both by investors and companies. In combination with the increasing operating costs that decrease profitability ratios, this could indicate the negative relationship in short run as explained in section 2.4.1 (Jensen, 2001). Without these investments, profitability ratios could have been considerably higher for 2017-2019. In conclusion, the surge of investments might be the explanation for the disappearing of the positive impact (Lopez et al., 2007). In the long run, the benefits will be generated but CSR investments usually take longer to pay off (Orsatio 2009). Finally, due to increased competition in the field of sustainable products and services, the positive impact could be smaller than expected.

Table 6: Main regression results on increasing impact of sustainability on profitability

	2014-2016			2017-2019		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Variables	**ROA_w**	**ROE_w**	**ROS_w**	**ROA_w**	**ROE_w**	**ROS_w**
Sustainability	0.013**	0.030*	0.013	0.006	0.005	0.006
	(0.006)	(0.017)	(0.011)	(0.007)	(0.018)	(0.013)
Total Assets_w	-0.000***	0.000	0.000	-0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Leverage_w	-0.011***	0.047***	-0.014***	-0.008***	0.054***	-0.013***
	(0.003)	(0.009)	(0.004)	(0.003)	(0.009)	(0.005)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Constant	0.035***	0.010	0.066***	0.051***	0.035**	0.114***
	(0.003)	(0.016)	(0.008)	(0.007)	(0.015)	(0.013)
Observations	1008	1008	1008	1008	1008	1008
R-squared	0.266	0.212	0.178	0.161	0.177	0.092
Adjusted R-squared	0.256	0.202	0.167	0.150	0.166	0.081

Table 6 shows the output of different OLS regressions with respect to the second hypothesis. The financial ratios, ROE, ROA and ROS are the dependent variables. The models are performed without stock compensation since this variable did not add explanatory value to the model. Regression (1-3) show the results for period 2014-2016 and (4-6) for 2017-2019. The variable of interest is sustainability with total assets and leverage as independent variables to control for omitted variable bias. In all columns, industry and year fixed effects are taken into account and clustered standard errors are shown in parenthesis. The asterisks indicate significance level: * p<0.10, ** p<0.05, *** p<0.01.

As explained above, the impact of sustainability seems to diminish over time. These results indicate a potential trend over 2014-2019. The possibility of a trend was mentioned in section 2.4.3 but was expected rather positive than negative. To investigate this trend, interaction terms between sustainability and years have been included. Therefore, the impact of sustainability over the years can be approached. Table 7 provides the results of the models with the interaction terms included. The chosen reference group is 2014, entailing easier inferences with respect to a trend. The impact for 2017-2019 seemed to diminish, therefore one would expect increasing negative coefficients as years pass. The adjusted R-squared does not change much for these models in comparison to table 6. For ROA, it drops from 0.200 to 0.199 and for ROE and ROS it remains the same (0.181 and 0.120). This suggests that the inclusion of interaction regressors does not add substantial predictive power.

The impact of sustainability is for both ROA and ROE significant at 5% level in the reference group 2014. Sustainable operations increased ROA and ROE by 0.014 and 0.035. These coefficients are very close to the observed effects for the time period 2014-2016 (0.013 and 0.030). There's still no evidence to suggest that sustainability increases ROS. Moreover, the interaction terms for 2017 and 2018 suggest interesting outcomes. A negative effect of sustainability in 2017 is observed for all profitability ratios at 5% significance level. This indicates that some event or occasion influenced the financial ratios negatively. ROA, ROE and ROS decreased by 0.013, 0.044 and 0.028 respectively, in comparison to 2014. The effect of sustainability in 2017 had large implications. The positive main effect of sustainability has disappeared completely and the effect for ROE and ROS even became negative in 2017. Moreover, the effect of sustainability in 2018 was also negative for ROA and ROE (at 10% level). The effects were slightly smaller than in 2017 with -0.011 and -0.034. The interaction terms for the other years are insignificant. This means that the effects of sustainability in 2015, 2016 and 2019 do not differ significantly from 2014. Therefore, it is likely that something triggers the negative effects in 2017 and 2018. As described on the previous page, the cause could be a surge in investments and additional costs that decrease the profitability in those years. Although, one would expect the same negative effects for 2019 then.

Given the outcomes of the interaction terms, there is no evidence to identify a trend either increasing or decreasing between 2014 and 2019. The negative effects are caused by 2017 and 2018, while in 2019 the effect was similar to 2014. So rather than speaking of a trend, one could speak of decreased impact of sustainability during a specific period.

Table 7: Regression results on the suggested increasing impact of sustainability.

	(1)	(2)	(3)
Variables	ROA_w	ROE_w	ROS_w
Sustainability	0.014**	0.035**	0.009
	(0.006)	(0.017)	(0.012)
Sustainability_2015	0.003	0.008	0.000
	(0.006)	(0.019)	(0.013)
Sustainability_2016	0.001	0.006	0.009
	(0.005)	(0.016)	(0.011)
Sustainability_2017	-0.013**	-0.044**	-0.028**
	(0.007)	(0.019)	(0.012)
Sustainability_2018	-0.011*	-0.034*	0.015
	(0.006)	(0.019)	(0.011)
Sustainability_2019	0.000	0.009	0.001
	(0.007)	(0.023)	(0.014)
Total Assets_w	-0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)
Leverage_w	-0.009***	0.051***	-0.013***
	(0.002)	(0.008)	(0.004)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Constant	0.044***	0.029**	0.090***
	(0.004)	(0.013)	(0.008)
R-squared	0.207	0.190	0.129
Adjusted R-squared	0.199	0.181	0.120

Table 7 shows the output of different OLS regressions with respect to the second hypothesis. The financial ratios, ROE, ROA and ROS are the dependent variables. The models are performed without stock compensation since this variable did not add explanatory value to the model. To investigate the possibility of a trend over time, interaction terms between sustainability and year are included with 2014 as reference group. The main variables are sustainability and the interaction terms with total assets and leverage as independent variables to control for omitted variable bias. In all columns, industry and year fixed effects are taken into account and clustered standard errors are shown in parenthesis. The asterisks indicate significance level: * p<0.10, ** p<0.05, *** p<0.01.

5.2.3 REVERSED CAUSALITY

Several studies mentioned the possibility of reversed causality between corporate profitability and sustainability (Margolis & Walsh, 2003). The leading slack resource theory states that large firms with high profitability ratios or superior resources are more likely to invest in ESG-related factors (Weber, 2008; Kurucz et al., 2008). To examine the existence of this suggested relation, the impact of profitability ratios has been assessed. In comparison to section 6.2.1, the independent and dependent variables have been be switched. These regressions examine the predictive value of profitability ratios on CSR. The main approach is the linear probability model, which is commonly used with binary dependent variables.

Table 8: Main regression results on reversed causality

	(1) **Sustainability**	(2) **Sustainability**	(3) **Sustainability**
ROA_w	0.553		
	(0.340)		
ROE_w		0.123	
		(0.113)	
ROS_w			0.053
			(0.184)
Total Assets_w	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Leverage_w	0.014	0.002	0.009
	(0.019)	(0.019)	(0.019)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Constant	0.005	0.026	0.025
	(0.060)	(0.057)	(0.060)
R-squared	0.119	0.117	0.115
Adjusted R-squared	0.112	0.110	0.108

Table 8 shows the output of different OLS regressions with respect to reversed causality. The dependent variable is sustainability and financial ratios ROE, ROA and ROS are independent variables. The models are performed without stock compensation since this variable did not add explanatory value to the model. The control variables are total assets and leverage to account for omitted variable bias. In all columns, industry and year fixed effects are taken into account and clustered standard errors are shown in parenthesis. The asterisks indicate significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 8 presents the outcomes of the three linear probability models examining whether higher profitability ratios increase CSR engagement. The adjusted R-squared lies around 0.110, implying that these regressions only capture about 11% of the variance of sustainability. This is relatively low, in comparison to the main model in 5.2.1, where the adjusted R-squared varied from 0.200 to 0.120. Most importantly, the coefficients of the financial ratios are insignificant. Therefore, no evidence is found to suggest that corporate performance impacts CSR engagement. Moreover, total assets tend to be decisive in whether a firm adopts sustainable operations or not. The assets of the companies are shown in thousands resulting in very low coefficients. If total assets increase by 1 million dollars, the possibility of sustainability increases with approximately 0.3% in all three regressions. This means that larger firms are more likely to adopt sustainable operations. Additionally, a logit and probit models are performed. No large differences were observed, and the R-squared statistics were very similar. The coefficients of the profitability ratios were also insignificant.

Finally, robustness of the results is checked via lagged explanatory variables, shown in appendix C table 2. The coefficients of the profitability ratios are still insignificant. Moreover, the adjusted R-squared barely differs from the values mentioned above, suggesting that there are no big differences between the original and lagged variables. In conclusion, the main regressions do not suffer from reversed causality, since profitability ratios do not seem to impact CSR. However, caution is required by interpreting these findings since profitability ratios might be correlated with the error-term and therefore suffer from endogeneity. The findings do not provide hard evidence but give an indication whether corporate performance impacts sustainability.

6 CONCLUSIONS

This section provides a summary of the results (section 6.1), recommendations (section 6.2), a discussion on the limitations of the conducted research and gives suggestions for further research (section 6.3).

6.1 CONCLUSIONS OF THE FINDINGS

Since the beginning of the 21st century, sustainability has been a vital topic in public debates. Politicians cannot ignore the environmental, social and governance (ESG) related concerns like greenhouse gas emissions or diversity anymore. Together, we need to create a sustainable future. Corporations can play an eminent role in this process. A company bears the obligation towards society to improve ESG standards and not solely focus on profitability, described as corporate social responsibility (CSR). The majority of the studies suggest a positive effect of sustainability on profitability, although no strict consensus has reached (McGuire et al., 1988). Sustainable operations would enable a firm to obtain competitive advantage (Porter & Kramer, 2006). Also, improved reliability and reputation leads to better performance (Kurucz, Colbert & Wheeler, 2008). But the question remains whether this impact is still visible nowadays or might be changing over time. Therefore, the main research question is the following: *"Do sustainable operations contribute to higher corporate profitability?"*

First, a univariate analysis has been conducted to determine whether key variables differ significantly among sustainable and conventional companies. Size, net income and stock compensation differ significantly for both samples (1% level). Moreover, the Welch t-test indicates that the mean of ROE differs across the two groups (10% level). However, according to the Whitney Mann-U test, no evidence was found to assume that ROA, ROE and ROS follow a different distribution. Secondly, several OLS regressions have been performed to test the developed hypotheses. The main model showed no significant relationship between sustainability and profitability. This contradicts the tendency that sustainability improves corporate performance. The same conclusions can be drawn from regressions with lagged explanatory variables.

Recently, studies suggested that ESG-related compensation could increase profitability and CSR engagement (Flammer et al., 2019). Also, the effect of stock compensation might differ for sustainable and conventional companies, because ESG-related compensation enforces the positive impact on profitability even more. Therefore, an interaction term between sustainability and stock compensation has been included in the model. In contrast to the suggested relation, the inclusion did not increase adjusted R-squared or show significant coefficients. These results also contradict the agency theory that stock compensation positively influences profitability ratios in order to increase personal benefits of managers and board members (Jensen & Meckling, 1979). The interaction term didn't add explanatory value on profitability and therefore has been excluded from the follow-up regressions.

Furthermore, a shift in consumer preferences towards sustainable products can be observed (Schäufele & Hamm, 2017). To determine whether the impact of sustainability increases over time, the entire sample was split up into 2014-2016 and 2017-2019. Interestingly, between 2014 and 2016, significant positive coefficients for ROA and ROE were observed (at 5% and 10% level). Sustainable operations increase ROA and ROE by respectively 0.013 and 0.030 on a scale of 0-0.14 and 0.04-0.41. These findings contrast with the insignificant coefficients for 2017-2019. No evidence was found to assume a positive impact of sustainability during 2017-2019. Additionally, the regression on ROA for the first period increases the adjusted R-squared substantially from 0.200 to 0.256 and decreases for 2017-2019 to 0.150. In conclusion, the impact of sustainability diminished or even disappeared over time. This contradicts with the suggested increased willingness-to-pay for sustainable products and services.

Moreover, the existence of a trend was examined via interaction terms between sustainability and years. Overall, a significant positive effect for sustainability was observed for ROA and ROE. However, significant negative coefficients were observed in 2017 (at 5% level). The effect of sustainability approached zero for ROA and even became negative for ROE and ROS. Similar results were found for 2018 (at 10% level). The results didn't indicate something like a trend, but only the negative effects of sustainability for 2017 and 2018. Possible explanations might be the loss of competitive advantage and intensified competition. Or the fact that new expectations among customers about sustainability might have reduced their willingness to pay a price premium. However, these scenarios seem highly unlikely, given the still rapidly increasing call for a sustainable future. Most likely, the impact of sustainability during 2017 and 2018 is decreased due to large investments. Between 2012 and 2018, the US tripled their sustainable investments and with corresponding integration costs, this could result in lower profitability (GSIA, 2019; Jensen, 2001; Lopez et al., 2007). In the short run, a negative relation could be observed but in the long run, these massive investments are likely to increase profitability.

Lastly, previous research with respect to sustainability and corporate performance mentioned the possibility of simultaneous or reversed causality. Therefore, this study examined the predictive power of financial ratios on CSR engagement. Companies with high profitability ratios are more likely to possess slack resources, providing the opportunity to invest in societal issues rather than only profitability (Kurucz et al., 2008). However, linear probability models on profitability with ROA, ROE and ROS as independent variables did not show significant results. Therefore, no evidence was found for reversed causality. To test the robustness of the results, a regression with lagged explanatory variables was performed. These outcomes were in line with the original variables and showed even lower adjusted R-squared statistics, implying lower explanatory power.

6.2 RECOMMENDATIONS

The general view on sustainability has drastically changed over the recent years. Previously, CSR was a specifically chosen strategy, but now stakeholders, customers and the government demand a proper performance on ESG factors. Sustainability is becoming a necessity rather than a choice. The full integration of CSR will take years and maybe even decades. This study examined a group of excellent sustainable performers. This is valuable information for managers and board directors because this group is most is most likely to show the potential effect of sustainability on profitability. If this group of excellent performers do not show significant results, the rest of the companies probably won't either. Companies need to make decisions to what extent they will invest in CSR, whether they want to become frontrunner or only to reach minimum targets and avoid fines. Additionally, for investors, profitability ratios are still leading in their views regarding the companies (Berman et al., 1999). Although certain social and environmental related targets need to be achieved by the company, they cannot weaken their focus on corporate profitability. Otherwise investors will be likely to ignore the firm and invest in the competitors. The general effect of sustainability is positive and only the effects in 2017 and 2018 were negative. Most likely, this is caused by a series of massive investments in sustainability that decrease profitability only in the short run. In general, this study indicates that sustainability increases profitability ratios ROA and ROE. Therefore, companies should invest in ESG-related factors. Integrating sustainable operations into business turns out to be a profitable strategy.

6.3 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

The main limitation of this research relates to the measurement of sustainable performance. Valuable information is neglected by defining the variable of interest as a dummy. A ranking or ideally an absolute performance measure would improve the accuracy of the research substantially. This would provide insights in relative performance and whether excellent sustainable performers benefit more than other companies. Also, this would enable conclusions on different topics such as possible diminishing returns or U-shape relations. Moreover, the DJSI presents leading companies per industry. There might be great variation in the level of CSR between the firms, but this is not shown by the dummy. However, suchlike databases are very difficult and expensive to access, and most databases are heavily susceptible to interpretation and methodology. In contrast, the composer of the DJSI, SAM group is acknowledged for its objectiveness and excellence (Beleo et al., 2004). Additionally, when using the DJSI as variable of interest, it would be informative to conduct both a regression and an event-study. This covers both the internal, unique characteristics of firms and provides information about how investors respond to and value the inclusion and exclusion from the DJSI. Information about increasing socially responsible investing (SRI) is widely available. Basically, SRI covers stocks and funds with good performance on ESG factors. In comparison, specific information of companies' expenditures on ESG factors is more difficult to access.

The dependent variable, defined as corporate performance is measured via profitability. Previous research has not agreed on this measurement but chosen variables can affect the outcomes and conclusions substantially. Further research could incorporate different measures of corporate performance, like Tobin's Q or earnings before interest, tax and amortization. Moreover, not all effects of sustainability are reflected in profitability measures (Wagner, 2010). For example, the reduction in carbon and nitrogen emissions is very important for the future of our planet but is not included in financial results. The tendency to include externalities in the balance sheet of companies is slowly getting more attention (Smit, 2019). Ideally, one should pick a dependent variable that reflects all consequences of sustainability. But since sustainability covers so many dimensions, this is difficult to agree upon and even more difficult to obtain.

Another possible limitation of this study relates to the construction of the dataset. The dataset was balanced manually, hence useful information might have been discarded. Firms were required to be consecutively included in the DJSI between 2014-2019. If sustainability increases profitability, this group is most likely to show the impact. These sustainable companies are the best performers with respect to sustainability and therefore represent the ultimate group. When this group of excellent performers do not show significant results, in all likelihood, the rest of the companies probably won't either. In addition, by asserting that control firms had to be included in the S&P 500 for six year consecutively, the control sample has been restricted. This requirement supposes a certain level of excellence and therefore results from the control variable might be too positive. This would undermine the actual effect of sustainability in this study, since the impact might be larger than observed. Further research could examine the unbalanced dataset, where sample bias probably won't affect the outcomes. Also, this study only covered six years, implying difficulties to conclude on short term versus long term effects. Because sustainability has grown in popularity since the start of the 21st century, further research could review data over a longer time period. This enables inferences about short- and long-term effects and provides insights about possible trends over the years. At last, the observed effects of sustainability on profitability in 2017 and 2018 differ significantly from the other years. Further research could focus on the cause of these deviations. The surge in ESG-related investments could provide an explanation, but then one would expect this negative effect for 2019 as well. Research could examine whether these negative effects tend to be exceptions or likely to occur in the future again.

The major concern of OLS regressions relates to endogeneity. Omitted variable bias is always a problem but can be solved (partly) by adding relevant control variables or performing an instrumental variable (IV) regression. However, an accurate IV as proxy for sustainability is very difficult to obtain and was therefore not feasible. Moreover, the existence of simultaneous causality requires caution when interpreting the impact of sustainability on profitability. The reversed impact was approached by lagging the independent variables and switching the independent and dependent variable. But for the latter, the conditional mean assumption was probably not met since the profitability ratios could be correlated with the error term. Further research could pay more attention to this reversed causality.

Furthermore, the extension to ESG-related executive compensation is very interesting and improves research on sustainability. The impact of renumeration structure on corporate performance has been examined extensively, but not yet specifically to sustainability. The results indicate that stock compensation didn't impact profitability and that the effect didn't differ among sustainable and conventional companies either. Based on previous research, a positive relationship was expected. However, stock compensation could be an inaccurate variable to reflect differences in ESG-related compensation. Further research could investigate the ESG-related compensation more extensively. Additionally, this study only included stock compensation, but other governance factors could be investigated as well. Characteristics like board diversity and CEO tenure might affect corporate performance and investments in CSR and therefore could be examined as well. However, this was beyond the scope of this study.

Moreover, the majority of the existing literature is focused on US' companies. In contrast to Europe, the US provides large indices like the S&P 500. For example, the Dutch or German main indices contain respectively 25 and 30 firms. Constructing a reliable dataset for European is highly susceptible to bias and therefore not chosen for this study (Lo & Sheu, 2007). However, there's not much research conducted on European samples, offering great opportunities for further research.

Finally, a recent study focused on indirect relationships, rather than direct ones. They examined the mediating role of competitive advantage, reputation and customer satisfaction (Saeidi et al., 2015). These factors were mentioned in section 2 as possible explanations for the impact of sustainability but it's interesting to investigate the explanatory value of such variables. This would shift the main field from direct to indirect relationships.

7 BIBLIOGRAPHY

Akinwande, M. O., Dikko, H. G., & Samson, A. (2015). Variance inflation factor: as a condition for the inclusion of suppressor variable (s) in regression analysis. *Open Journal of Statistics*, *5*(07), 754.

Alexander, D. E. (2002). Principles of emergency planning and management. *Oxford University Press on Demand.*

Almeida, H., Fos, V., & Kronlund, M. (2016). The real effects of share repurchases. *Journal of Financial Economics*, *119*(1), 168-185.

Ameer, R., & Othman, R. (2012). Sustainability practices and corporate financial performance: A study based on the top global corporations. *Journal of business ethics*, *108*(1), 61-79.

Aras, G., Aybars, A., & Kutlu, O. (2010). Managing corporate performance. *International Journal of productivity and Performance management*.

Artiach, T., Lee, D., Nelson, D., & Walker, J. (2010). The determinants of corporate sustainability performance. *Accounting & Finance*, *50*(1), 31-51.

Balzani, V., & Armaroli, N. (2010). *Energy for a sustainable world: from the oil age to a sun-powered future*. John Wiley & Sons.

Bloomberg. (2017). Retrieved from Global sustainable investments grow by 25% to 23 trillion: https://www.bloomberg.com/professional/blog/global-sustainable-investments-grow-25-23-trillion/

Blundell, R., Bond, S., Devereux, M., & Schiantarelli, F. (1992). Investment and Tobin's Q: Evidence from company panel data. *Journal of econometrics*, *51*(1-2), 233-257.

Bowen, H. (1953) *Social Responsibilities of the Businessman.* New York: Harper & Row.

Bragdon, J. H., & Marlin, J. (1972). Is pollution profitable. *Risk management*, *19*(4), 9-18.

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange multiplier test and its applications to model specification in econometrics. *The review of economic studies*, *47*(1), 239-253.

Brundtland, G. H., Khalid, M., Agnelli, S., Al-Athel, S., & Chidzero, B. (1987). Our common future. *New York*, 8.

Cameron, A. C., & Miller, D. L. (2015). A practitioner’s guide to cluster-robust inference. *Journal of human resources*, *50*(2), 317-372.

Carroll, A. B. (1979). A three-dimensional conceptual model of corporate performance. *Academy of management review*, *4*(4), 497-505.

Carroll, A. B. (1994). Social issues in management research: Experts' views, analysis, and commentary. *Business & Society*, *33*(1), 5-29.

Carter, D. A., Simkins, B. J., & Simpson, W. G. (2003). Corporate governance, board diversity, and firm value. *Financial review*, *38*(1), 33-53.

Chen, L. J., & Chen, S. Y. (2011). The influence of profitability on firm value with capital structure as the mediator and firm size and industry as moderators. *Investment Management and Financial Innovations*, *8*(3), 121-129.

Cochran, P. L., & Wood, R. A. (1984). Corporate social responsibility and financial performance. *Academy of management Journal*, *27*(1), 42-56.

Consolandi, C., Jaiswal-Dale, A., Poggiani, E., & Vercelli, A. (2009). Global standards and ethical stock indexes: The case of the Dow Jones Sustainability Stoxx Index. *Journal of Business Ethics*, *87*(1), 185-197.

Core, J. E., Holthausen, R. W., & Larcker, D. F. (1999). Corporate governance, chief executive officer compensation, and firm performance. *Journal of financial economics*, *51*(3), 371-406.

Davis, K. (1960). Can business afford to ignore corporate social responsibilities. *California management review*, *76*.

Davis, K. (1967). Understanding the social responsibility puzzle. *Business horizons*, *10*(4), 45-50.

DeCarlo, L. T. (1997). On the meaning and use of kurtosis. *Psychological methods*, *2*(3), 292.

Douglas, M. (1976). Relative poverty, relative communication. *Traditions of Social Policy, Oxford: Basil Blackwell*, 197-215.

Dowling, J., & Pfeffer, J. (1975). Organizational legitimacy: Social values and organizational behavior. *Pacific sociological review*, *18*(1), 122-136.

Dunk, A. S. (2007). Assessing the effects of product quality and environmental management accounting on the competitive advantage of firms. *Australasian Accounting Business and Finance Journal*, *1*(1), 3.

Eisenhardt, K. M. (1989). Agency theory: An assessment and review. *Academy of management review*, *14*(1), 57-74.

Epstein, M. J., & Roy, M. J. (2001). Sustainability in action: Identifying and measuring the key performance drivers. *Long range planning*, *34*(5), 585-604.

Farre-Mensa, J., Michaely, R., & Schmalz, M. (2014). Payout policy. *Annu. Rev. Financ. Econ.*, *6*(1), 75-134.

Flammer, C., Hong, B., & Minor, D. (2019). Corporate governance and the rise of integrating corporate social responsibility criteria in executive compensation: Effectiveness and implications for firm outcomes. *Strategic Management Journal*, *40*(7), 1097-1122.

Fodor, A., & Stowe, J. D. (2012). Financial market reactions to a company disaster: the BP case. *Journal of Applied Finance (Formerly Financial Practice and Education)*, *22*(1).

Forbes. (2019). Retrieved from Saudi Aramco IPO hits 2 trillion mark but forecast still guarded: https://www.forbes.com/sites/arielcohen/2019/12/18/saudi-aramco-ipo-hits-2-trillion-mark-but-forecast-still-guarded/

Fortuna, M. E., Simion, I. M., & Gavrilescu, M. (2011). Sustainability in environmental remediation. *Environmental Engineering & Management Journal (EEMJ)*, *10*(12).

Freeman, R. (1984) *Strategic Management: A Stakeholder Approach*. Marsfield: Pitman Publishing Inc.

Freeman, R. (1994). The politics of stakeholder theory: Some future directions. *Business ethics quarterly*, 409-421.

Friedman, M. (1962). Capitalism and freedom. *University of Chicago*.

Friedman, M. (1970). The Social Responsibility of Business is to Increase its Profits. *New York Times Magazine.*

Galbreath, J., & Shum, P. (2012). Do customer satisfaction and reputation mediate the CSR–FP link? Evidence from Australia. *Australian Journal of Management*, *37*(2), 211-229.

Garriga, E., & Melé, D. (2004). Corporate social responsibility theories: Mapping the territory. *Journal of business ethics*, *53*(1-2), 51-71.

George, R. A., Siti-Nabiha, A. K., Jalaludin, D., & Abdalla, Y. A. (2016). Barriers to and enablers of sustainability integration in the performance management systems of an oil and gas company. *Journal of cleaner production*, *136*, 197-212.

Gillan, S., Hartzell, J. C., Koch, A., & Starks, L. T. (2010). Firms' environmental, social and governance (ESG) choices, performance and managerial motivation. *Unpublished working paper*.

Graham, J. R., & Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of financial economics*, *60*(2-3), 187-243.

GSIA. (2019). Retrieved from GSIR: http://www.gsi-alliance.org/wp-content/uploads/2019/03/GSIR_Review2018.3.28.pdf

Hawkes, J. (2001). *The fourth pillar of sustainability: Culture's essential role in public planning*. Common Ground.

Hedstrom, P., & Swedberg, R. (1998). *Social mechanisms*. Cambridge University Press: Cambridge.

International Finance Corporation. (2005). *Investing for Long-Term Value*.

Jackson, T. (2005). Motivating sustainable consumption. *Sustainable Development Research Network*, *29*(1), 30-40.

Jennrich, R. I., & Schluchter, M. D. (1986). Unbalanced repeated-measures models with structured covariance matrices. *Biometrics*, 805-820.

Jensen, M. C., & Meckling, W. H. (1979). Theory of the firm: Managerial behavior, agency costs, and ownership structure. In *Economics social institutions* (pp. 163-231). Springer, Dordrecht.

Jensen, M. C. (2001). Value maximization, stakeholder theory, and the corporate objective function. *Journal of applied corporate finance*, *14*(3), 8-21.

Jo, H., & Harjoto, M. A. (2012). The causal effect of corporate governance on corporate social responsibility. *Journal of business ethics*, *106*(1), 53-72.

Kaplan, R. S., & Norton, D. P. (2005). The balanced scorecard: measures that drive performance. *Harvard business review*, *83*(7), 172.

Keim, G. D. (1978). Corporate social responsibility: An assessment of the enlightened self-interest model. *Academy of management review*, *3*(1), 32-39.

Kuhlman, T., & Farrington, J. (2010). What is sustainability? *Sustainability*, *2*(11), 3436-3448.

Kurucz, E. C., Colbert, B. A., & Wheeler, D. (2008). The business case for corporate social responsibility. In *The Oxford handbook of corporate social responsibility*.

Lo, S. F., & Sheu, H. J. (2007). Is corporate sustainability a value-increasing strategy for business?. *Corporate Governance: An International Review*, *15*(2), 345-358.

López, M. V., Garcia, A., & Rodriguez, L. (2007). Sustainable development and corporate performance: A study based on the Dow Jones sustainability index. *Journal of Business Ethics*, *75*(3), 285-300.

Mahon, J. F., & McGowan, R. (1991). *Searching for the common good: A process-oriented approach*. Boston University, School of Management.

Majeed, S. (2011). The impact of competitive advantage on organizational performance. *European Journal of Business and Management*, *3*(4), 191-196.

Majumdar, S. K., & Marcus, A. A. (2001). Rules versus discretion: The productivity consequences of flexible regulation. *Academy of Management Journal*, *44*(1), 170-179.

Malkiel, B. G., & Fama, E. F. (1970). Efficient capital markets: A review of theory and empirical work. *The journal of Finance*, *25*(2), 383-417.

Margolis, J. D., & Walsh, J. P. (2003). Misery loves companies: Rethinking social initiatives by business. *Administrative science quarterly*, *48*(2), 268-305.

Mann, H. B., & Whitney, D. R. (1947). On a test of whether one of two random variables is stochastically larger than the other. *The annals of mathematical statistics*, 50-60.

McGuire, J. B., Sundgren, A., & Schneeweis, T. (1988). Corporate social responsibility and firm financial performance. *Academy of management Journal*, *31*(4), 854-872.

McIntosh, M., McAntosh, M., Coleman, G., Jones, K. A., & Leipziger, D. (1998). *Corporate citizenship*. Financial Times/Prentice Hall.

McWilliams, A., & Siegel, D. (2001). Corporate social responsibility: A theory of the firm perspective. *Academy of management review*, *26*(1), 117-127.

Mehran, H. (1995). Executive compensation structure, ownership, and firm performance. *Journal of financial economics*, *38*(2), 163-184.

Melé, D. (2002). Not only stakeholder interests. The firm oriented toward the common good. *Rethinking the purpose of business. Interdisciplinary essays from catholic social tradition*, 190-214.

Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of management review*, *22*(4), 853-886.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American economic review*, *48*(3), 261-297.

Mögele, B., & Tropp, J. (2010). The emergence of CSR as an advertising topic: a longitudinal study of German CSR advertisements. *Journal of Marketing Communications*, *16*(3), 163-181.

Mohit. (2020). Retrieved from 11 Major Oil Spills Of The Maritime World: https://www.marineinsight.com/environment/11-major-oil-spills-of-the-maritime-world/

Montiel, I. (2008). Corporate social responsibility and corporate sustainability: Separate pasts, common futures. *Organization & Environment*, *21*(3), 245-269.

Myers, S. C. (1984). The capital structure puzzle. *The journal of finance*, *39*(3), 574-592.

Myers, S. C. (2001). Capital structure. *Journal of Economic perspectives*, *15*(2), 81-102.

Myers, S. C. (2003). Financing of corporations. In *Handbook of the Economics of Finance* (Vol. 1, pp. 215-253). Elsevier.

O’brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & quantity*, *41*(5), 673-690.

Orsato, R. J. (2009). When Does it Pay to be Green? In *Sustainability strategies* (pp. 3-22). Palgrave Macmillan, London.

Ortas, E., Álvarez, I., & Garayar, A. (2015). The environmental, social, governance, and financial performance effects on companies that adopt the United Nations Global Compact. *Sustainability*, *7*(2), 1932-1956.

Palia, D. (2001). The endogeneity of managerial compensation in firm valuation: A solution. *The Review of Financial Studies*, *14*(3), 735-764.

Perrini, F., Russo, A., & Tencati, A. (2007). CSR strategies of SMEs and large firms. Evidence from Italy. *Journal of business ethics*, *74*(3), 285-300.

Pfeffer, J., & Salancik, G. R. (2003). *The external control of organizations: A resource dependence perspective*. Stanford University Press.

Porter, M. E., & Kramer, M. R. (2002). The competitive advantage of corporate.

Porter, M. E., & Kramer, M. R. (2006). The link between competitive advantage and corporate social responsibility. *Harvard business review*, *84*(12), 78-92.

Porter, M. E. (2008). *Competitive strategy: Techniques for analyzing industries and competitors*. Simon and Schuster.

Porter, M. E., Hills, G., Pfitzer, M., Patscheke, S., & Hawkins, E. (2011). Measuring shared value. *How to Unlock Value by Linking Social and Business Results*, 10-11.

Preston, L. E., & O'bannon, D. P. (1997). The corporate social-financial performance relationship: A typology and analysis. *Business & Society*, *36*(4), 419-429.

Preston, L. E., & Post, J. E. (1981). Private management and public policy. *California Management Review*, *23*(3), 56-62.

PricewaterhouseCoopers. (2016). *Redifining business succes in a changing world.* Retrieved from https://www.pwc.com/gx/en/ceo-survey/2016/landing-page/pwc-19th-annual-global-ceo-survey.pdf

Ruxton, G. D. (2006). The unequal variance t-test is an underused alternative to Student's t-test and the Mann–Whitney U test. *Behavioral Ecology*, *17*(4), 688-690.

Saeidi, S. P., Sofian, S., Saeidi, P., Saeidi, S. P., & Saaeidi, S. A. (2015). How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of business research*, *68*(2), 341-350.

Sarzosa, M. (2012). Introduction to robust and clustered standard errors. *Department of Economics University of Maryland*.

Schaltegger, S., & Burritt, R. (2005). *Corporate sustainability* (Doctoral dissertation, Edward Elgar).

Schaltegger, S., & Burritt, R. (2018). Business cases and corporate engagement with sustainability: Differentiating ethical motivations. *Journal of Business Ethics*, *147*(2), 241-259.

Schäufele, I., & Hamm, U. (2017). Consumers' perceptions, preferences and willingness-to-pay for wine with sustainability characteristics: A review. *Journal of Cleaner production*, *147*, 379-394.

Scherer, A. G., & Palazzo, G. (2007). Toward a political conception of corporate responsibility: Business and society seen from a Habermasian perspective. *Academy of management review*, *32*(4), 1096-1120.

Seyfang, G. (2005). Shopping for sustainability: can sustainable consumption promote ecological citizenship? *Environmental politics*, *14*(2), 290-306.

Silvestre, B. S., & Gimenes, F. A. P. (2017). A sustainability paradox? Sustainable operations in the offshore oil and gas industry: The case of Petrobras. *Journal of Cleaner Production*, *142*, 360-370.

Simpson, W. G., & Kohers, T. (2002). The link between corporate social and financial performance: Evidence from the banking industry. *Journal of business ethics*, *35*(2), 97-109.

Smit, J. (2019). *Het grote gevecht & het eenzame gelijk van Paul Polman*. Netherlands: Prometheus.

Smith, W., & Higgins, M. (2000). Cause-related marketing: Ethics and the ecstatic. *Business & Society*, *39*(3), 304-322.

Smith W., & Watts, R. L. (1992). The investment opportunity set and corporate financing, dividend, and compensation policies. *Journal of financial Economics*, *32*(3), 263-292.

Stock, J. H., & Watson, M. W. (2007). *Introduction to econometrics*. Boston: Pearson/Addison Wesley.

S&P Global. (2020). Index Family Overview. Retrieved from https://www.spglobal.com/esg/csa/indices/

S&P Global. (2020). DJSI historical annual review. Retrieved from https://www.spglobal.com/esg/csa/csa-resources/review-history

Udayasankar, K. (2008). Corporate social responsibility and firm size. *Journal of business ethics*, *83*(2), 167-175.

Ullmann, A. A. (1985). Data in search of a theory: A critical examination of the relationships among social performance, social disclosure, and economic performance of US firms. *Academy of management review*, *10*(3), 540-557.

United Nations. (2015). Sustainable Development Goals. Retrieved from: https://sustainabledevelopment.un.org/?menu=1300

Vance, S. C. (1975). Are socially responsible corporations good investment risks. *Management review*, *64*(8), 19-24.

Van Loo, E. J., Caputo, V., Nayga Jr, R. M., & Verbeke, W. (2014). Consumers' valuation of sustainability labels on meat. *Food Policy*, *49*, 137-150.

Van Loo, E. J., Caputo, V., Nayga Jr, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attributes. *Ecological Economics*, *118*, 215-225.

Van Marrewijk, M. (2003). Concepts and definitions of CSR and corporate sustainability: Between agency and communion. *Journal of business ethics*, *44*(2-3), 95-105.

Varadarajan, P. R., & Menon, A. (1988). Cause-related marketing: A coalignment of marketing strategy and corporate philanthropy. *Journal of marketing*, *52*(3), 58-74.

Visual Capitalist. (2020). Retrieved from Rise of sustainable investing: https://www.visualcapitalist.com/rise-of-sustainable-investing/

Vogelsang, T. J. (2012). Heteroskedasticity, autocorrelation, and spatial correlation robust inference in linear panel models with fixed-effects. *Journal of Econometrics*, *166*(2), 303-319.

Votaw, D., & Sethi, S. P. (1973). The corporate dilemma: Traditional values versus contemporary problems.

Waddock, S. A., & Graves, S. B. (1997). The corporate social performance–financial performance link. *Strategic management journal*, *18*(4), 303-319.

Wagner, M. (2010). Corporate social performance and innovation with high social benefits: A quantitative analysis. *Journal of Business Ethics*, *94*(4), 581-594.

Weber, M. (2008). The business case for corporate social responsibility: A company-level measurement approach for CSR. *European Management Journal*, *26*(4), 247-261.

Wood, D. J. (2010). Measuring corporate social performance: A review. *International journal of management reviews*, *12*(1), 50-84.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: green consumer behaviour when purchasing products. *Sustainable development*, *18*(1), 20-31.

Appendix A

Figure 1: Histogram Total Assets

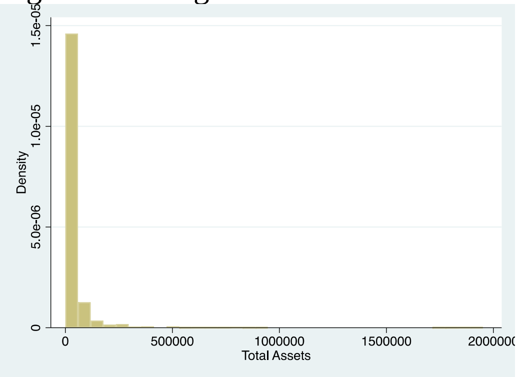


Figure 2: Histogram winsorized Total Assets

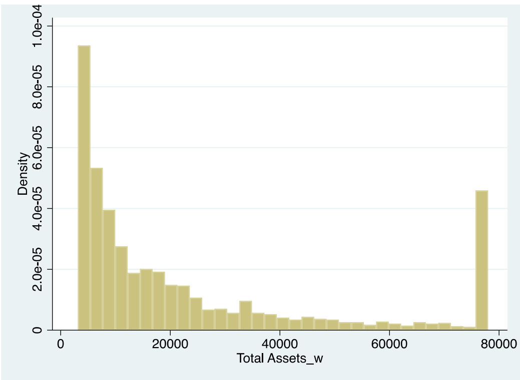


Figure 3: Histogram Leverage

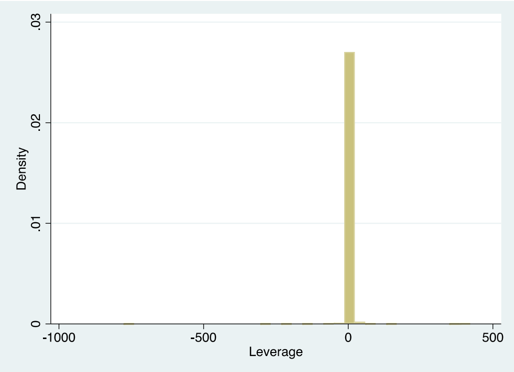


Figure 4: Histogram winsorized Leverage

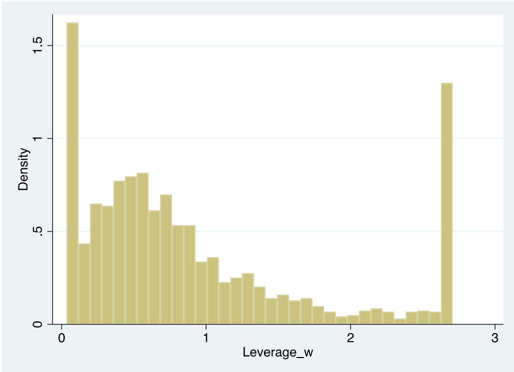


Figure 5: Histogram Net Income

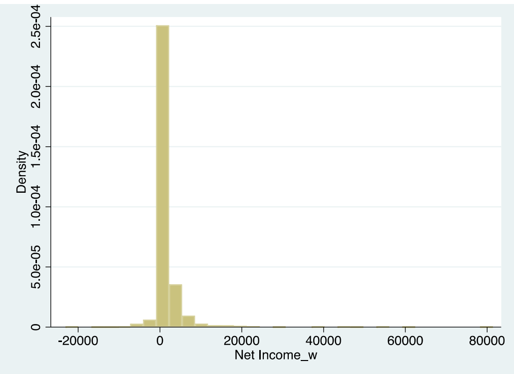


Figure 6: Histogram winsorized Net Income

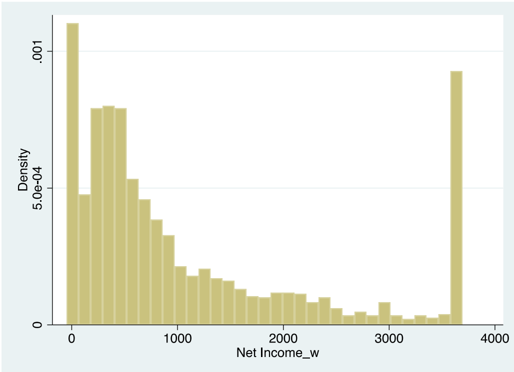


Figure 7: Histogram ROA

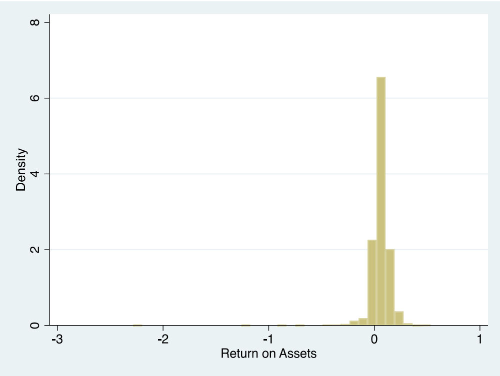


Figure 8: Histogram winsorized ROA

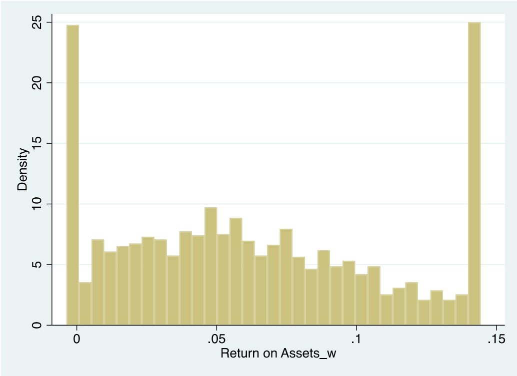


Figure 9: Histogram ROE

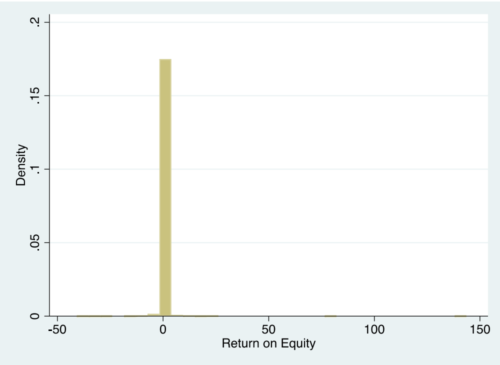


Figure 10: Histogram winsorized ROE

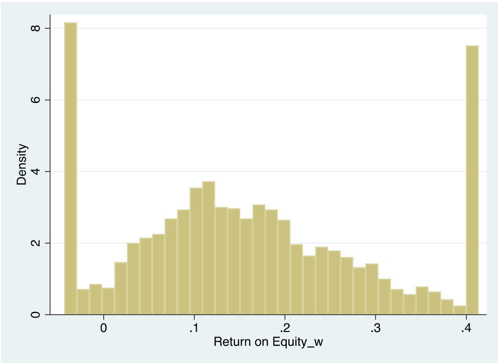


Figure 11: Histogram ROS

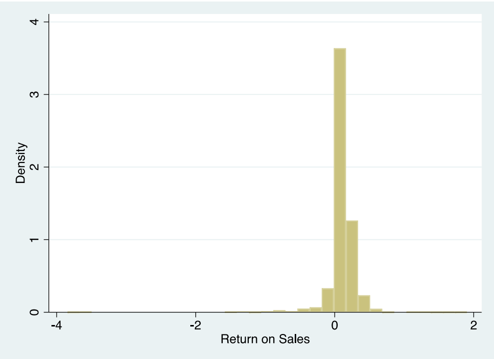


Figure 12: Histogram winsorized ROS

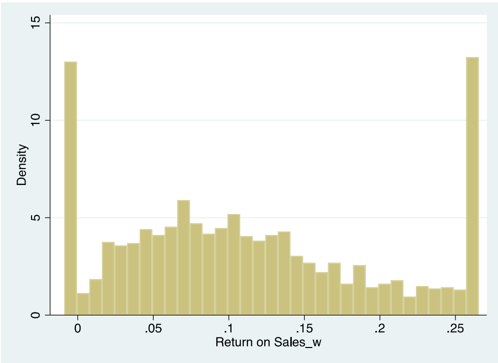


Figure 13: Histogram Stock Comp.

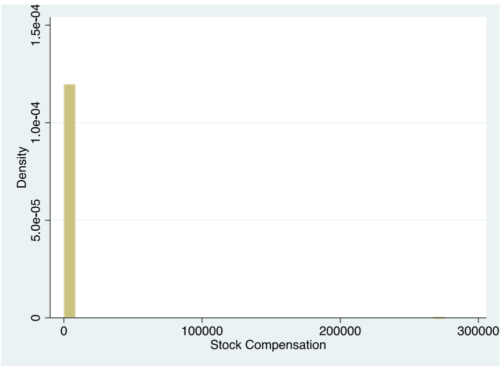
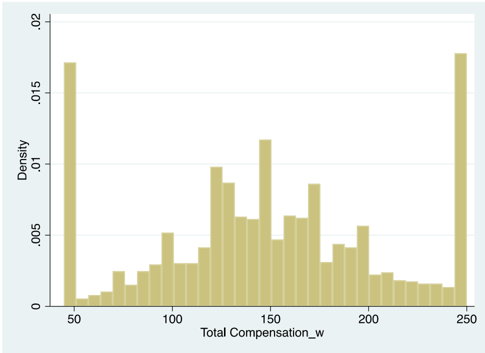


Figure 14: Histogram winsorized Stock comp.



APPENDIX B

Table 1: Breusch-Pagan Lagrange Multiplier test

Variable	Chibar2	P-value
Return on Assets_w	1910.44	<0.001
Return on Equity_w	1440.58	<0.001
Return on Sales_w	1776.80	<0.001

Table 1 presents the test statistics for the Breusch-Pagan Lagrange Multiplier test to determine whether to use OLS regression need to take RE / FE into account.

Table 2: Wooldridge test

Dependent variable	F-test	P-value
ROA_w	28.399	<0.001
ROE_w	9.466	0.002
ROS_w	27.749	<0.001

Table 2 presents test statistics for the Wooldridge to test for serial autocorrelation in longitudinal studies. The used models include profitability ratios as dependent variables with sustainability, size, leverage and interaction between stock compensation and sustainability as explanatory variables.

Table 3: Correlation matrix

Variable	Sustainability	Total Assets_w	Leverage_w	Net Income_w	ROA_w	ROE_w	ROS_w	Stock Comp_w
Sustainability	1.000							
Total Assets_w	0.289***	1.000						
	(0.000)							
Leverage_w	0.040*	0.099***	1.000					
	(0.069)	(0.000)						
Net Income_w	0.297***	0.673***	0.031	1.000				
	(0.000)	(0.000)	(0.169)					
ROA_w	0.006	-0.256***	-0.168***	0.314***	1.000			
	(0.791)	(0.000)	(0.000)	(0.000)				
ROE_w	0.046**	-0.045**	0.320***	0.360***	0.671***	1.000		
	(0.039)	(0.045)	(0.000)	(0.000)	(0.000)			
ROS_w	-0.007	0.010	-0.109***	0.354***	0.577***	0.382***	1.000	
	(0.760)	(0.658)	(0.000)	(0.000)	(0.000)	(0.000)		
Stock Comp_w	0.106***	0.132***	-0.043*	0.150***	-0.004	-0.030	0.009	1.000
	(0.000)	(0.000)	(0.055)	(0.000)	(0.842)	(0.173)	(0.682)	

Table 3 presents the correlations of the variables described in section 3. Perfect multicollinearity means a correlation of 1. The p-values are presented in parenthesis and the asterisks indicate the significance level: * p<0.10, ** p<0.05, *** p<0.01.

Table 4: VIF test

Variable	VIF
Return on Assets_w	4.09
Net Income_w	3.53
Assets Total_w	3.29
Return on Equity_w	2.94
Leverage_w	1.59
Return on Sales_w	1.59
Stock Compensation_w	1.03
Mean VIF	2.58

Table 4 presents the outcomes of the VIF test, to detect potential multicollinearity. An outcome of 10 is assumed to indicate multicollinearity.

Table 5: Breusch-Pagan test

Dependent Variable	Chi2	P-value
Return on Assets_w	21.16	<0.001
Return on Equity_w	106.05	<0.001
Return on Sales_w	2.09	0.148

Table 5 provides the test-statistics for the Breusch-Pagan test, the detect potential heteroskedasticity. The used models include profitability ratios as dependent variables with sustainability, size, leverage and the interaction term between stock compensation and sustainability as explanatory variables.

Table 6: Industry distribution

SIC Industry	Frequency	Firms	Percentage
Mining	162	27	8%
Construction	30	5	1%
Manufacturing	876	146	43%
Transportation, Communication, Electric, Gas and Sanitary Service	168	28	8%
Wholesale Trade	48	8	2%
Retail Sale	72	12	4%
Finance, Insurance and Real Estate	354	59	18%
Services	288	48	14%
Nonclassifiable	18	3	1%
Total	**2016**	**336**	**100%**

Table 6 presents an overview of the firms included in the dataset. The following industries are obtained: mining (1000-1499), construction (1500-1799), manufacturing (2000-3999), transportation, communications, electric, gas and sanitary (4000-4999), wholesale trade (5000-5199), retail trade (5200-5999), finance, insurance and real estate (6000-6799), services (7000-8999) and nonclassifiable (9900-9999).

APPENDIX C

Table 1: Main regression results with lagged variables on the relationship of sustainability on profitability

Variable	(1) ROA_w	(2) ROE_w	(3) ROS_w	(4) ROA_w	(5) ROE_w	(6) ROS_w
L.Sustainability	0.008	0.016	0.002	0.032*	0.109**	0.026
	(0.006)	(0.018)	(0.012)	(0.018)	(0.054)	(0.033)
L.Total Assets_w	-0.000***	0.000	0.000	-0.000***	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
L.Leverage_w	-0.008***	0.045***	-0.011**	-0.008****	0.044***	-0.011***
	(0.002)	(0.007)	(0.004)	(0.002)	(0.007)	(0.004)
L.Stock Comp_w				0.000	0.000	0.000
				(0.000)	(0.000)	(0.000)
L.Sust *Stock Comp_w				0.000	0.001*	0.000
				(0.000)	(0.000)	(0.000)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Constant	0.036***	0.012	0.068***	0.039***	0.014	0.078***
	(0.005)	(0.013)	(0.008)	(0.007)	(0.020)	(0.013)
Observations	1680	1680	1680	1680	1680	1680
R-squared	0.196	0.169	0.132	0.198	0.173	0.133
Adjusted R-squared	0.188	0.161	0.124	0.190	0.165	0.125

Table 1 shows the output of different OLS models to test the robustness of the first hypothesis with one-period lagged variables. The financial ratios, ROE, ROA and ROS are the dependent variables. Regressions (1-3) show the results with the interaction term of stock compensation and sustainability excluded and (4-6) included. The variable of interest is sustainability with total assets, leverage and stock compensation as independent variables to control for omitted variable bias. In all columns, industry and year fixed effects are taken into account and clustered standard errors are in parenthesis are shown. The asterisks indicate significance level: * $p<0.10$, ** $p<0.05$, *** $p<0.01$

Table 2: Main regression results with lagged variables on reversed causality

Variable	(1) Sustainability	(2) Sustainability	(3) Sustainability
L.ROA_w	0.504		
	(0.340)		
L.ROE_w		0.116	
		(0.116)	
L.ROS_w			0.040
			(0.187)
L.Total Assets_w	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
L.Leverage_w	0.009	0.002	0.005
	(0.020)	(0.019)	(0.019)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Constant	0.015	0.006	0.006
	(0.063)	(0.058)	(0.063)
R-squared	0.122	0.120	0.118
Adjusted R-squared	0.114	0.112	0.110

Table 2 shows the output of different OLS models to test reversed causality with one-period lagged variables. The dependent variable is sustainability and financial ratios ROE, ROA and ROS are the explanatory variables. The models are performed without the interaction term between sustainability and stock compensation since this variable did not add explanatory value to the model. The control variables are total assets and leverage to account for omitted variable bias. In all columns, industry and year fixed effects are taken into account and clustered standard errors are in parenthesis are shown. The asterisks indicate significance level: * p<0.10, ** p<0.05, *** p<0.01.