

This is the title of my thesis

Pierrick Kinif

A thesis submitted for the Master's Degree in Business Management and Administration,
Finance Specialization



Supervised by:

Prof. Sophie Béreau

Prof. Jean-Yves Gnabo

Faculty of Economics, Social Sciences and Business Administration

University of Namur, Belgium

May 2018

Abstract

This is an abstract

Aknowledgments

I would like to thank some of you . . .

Contents

Abstract	i
Aknowledgments	ii
List of Tables	iv
List of Figures	v
Introduction	1
1 Literature Review	2
1.1 Two perspectives on Corporate Environmental Performance	2
1.2 Does it pay to be green?	2
1.3 CEP and CFP as a broad meta-construct	3
1.4 When does it pay to be green?	4
2 Research Framework	6
3 Data	7
3.1 Overview	7
3.2 Dependent Variables	7
3.3 Independent Variables	9
3.4 Control Variables	10
4 Methodology	13
4.1 Econometric model	13
4.2 Sensitivity Analysis	14
5 Results	15
5.1 Descriptive Statistics	15
5.2 Some boxplots and histogram	15
5.3 Cooks Distance	20
6 Discussion	23
Conclusion	24
Appendix	25
Appendix A : This is an appendix a	25
Appendix B : This is an appendix b	26

References	27
-------------------	-----------

List of Tables

3.1	Variable Definition	11
3.2	Sample selection of the database	12

List of Figures

2.1 Research Framework 6

Introduction

Over the past decades, humanity is progressively becoming aware of the finiteness of earth's resources and its impact on the current global warming. On the one hand, Houghton and Change (1996) anticipated in their first report an average global warming between $+1^{\circ}$ and $+3.5^{\circ}$ C until 2100 relative to the temperature of 1990. They also warned that an increase of temperatures superior to $+2^{\circ}$ C could have some harsh climatic repercussions. On the other hand the Kyoto Protocol had been written in 1997, enforced in 2005 and led to the first Global Agreement on global warming during the Paris Conference in 2015. Those different solutions implemented over the past decades did not have any significant impacts on the fight against global warming. Greenhouse Gas Emissions (GGE) have still increased considerably across years. Although the environmental consciousness-raising had already gained ground, according to Jean Jouzel (2017) human being have to act now if he wants to have a chance to reduce effects of climate change.

For the last several decades, companies have been more and more considered as entities responsible for stewardship of the natural environment (Majumdar and Marcus 2001; Przychodzen and Przychodzen 2015). Ecosystem degradation and resources depletion engender a threat to firm's longevity (Dowell, Hart, and Yeung 2000), and as a reaction, firms have to pro-actively adopt an environmental strategy (Hart 1995). In his speech at Lloyds of London 2015, Mark Carney, Governor of the Bank of England and Chair of the Financial Stability Board (FSB), identified climate change as one of the most material threats to financial stability (Elliott 2015). Companies facing higher risks associated to climate change are the ones subject to greater incentives to develop green strategies (Hoffman 2005). However, both economic benefits and strategic opportunities deriving from sustainable development are usually underestimated by managers and still too many companies do not feel concerned about global warming (Berchicci and King 2007; Hart 1995). Moreover, according to Scarpellini, Valero-Gil, and Portillo-Tarragona (2016), green projects are not common in companies of many countries because of significant barriers and a negligible culture of excluding sustainable development from an organization's strategy. If we consider that people's actions reflect a variable mix of altruistic motivation, material self-interest, and social or self-image concerns (Bénabou and Tirole 2006), demonstrating that green development is a significant interest for firms could be a serious step forward in the fight against global warming.

Prendre en compte les remarques de Prof. Béreau 050418, see pdf dans dropbox

To be continued...

1 Literature Review

1.1 Two perspectives on Corporate Environmental Performance

The paradigm of profit maximization of Friedman (1970) have been widely challenged these last decades. Whereas Friedman (1970) considers investment in pollution efficient technology as deviation from the wealth maximization goal, the literature is showing growing evidences that improving a company's environmental performance can lead to better economic or financial performance, and not necessarily to an increase in cost. Ambec and Lanoie (2008) have demonstrated that the expenses incurred to reduce pollution can be partly or completely offset by gains made elsewhere. Porter and van der Linde (1995) argued that rather than simply adding to cost, properly crafted environmental standards can trigger innovation offsets, allowing companies to improve their resource productivity. He even redefined the self concept of value creation in advocating that the solution lies in the principle of shared value which involves creating economic value in a way that also creates value for society by addressing its needs and challenges (Porter and Kramer 2011, Porter and Kramer (2018)). Freeman (1984) call to a radical rethinking of our model of the firm. According to him, companies have to consider their stakeholder, namely *"any group or individual who can affect or is affected by the achievement of an organisation's objectives"* (p.25) or else face negative confrontation from non-shareholder groups, which can lead to diminished shareholder value, through boycotts, lawsuits and protests etc. In other words, Freeman (1984) summarizes the idea that companies should consider corporate environmental performance as unavoidable cost of doing business.

1.2 Does it pay to be green?

While more and more companies are embracing this new paradigm and develop profitable business strategies that deliver tangible social benefits, others keep the old fashion way of Friedman (1970). This dichotomy have interested scholars and since they have sought to empirically answer the question, *"Does it pay to be green?"*. In a competitive business world, answering this question is crucial to provide a genuine economic justification to the new paradigm (Lu et al. 2014). Although results are mixed, the large quantity of studies on the nexus between Corporate Environmental Performance (i.e. CEP) and Corporate Financial Performance (i.e. CFP) in the last two decades allowed the appearance of recent meta-analyses¹ (Orlitzky and Benjamin 2001, Orlitzky, Schmidt, and Rynes (2003), Wu (2006), Albertini (2013), Dixon-Fowler et al. (2013), Endrikat, Guenther, and Hoppe (2014), Lu et al. (2014),

¹The GICS classification is composed of eleven industry sectors, namely : Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Pharmaceuticals / Biotechnology, Telecommunication Services and Utilities.

Wang, Dou, and Jia (2016), Busch and Friede (2018)) and all suggest that indeed it pays to be green. More precisely, a positive and bidirectional relationship does exist between CEP and CFP meaning that successful firms may have the resources necessary to improve their environmental performance, which in turn increases financial benefits that again can be invested back into further improvements of CEP (Endrikat, Guenther, and Hoppe 2014).

1.3 CEP and CFP as a broad meta-construct

CFP is a broad meta-constructs and the current literature have shown that each construct play a moderator role in the relationship between CEP and CFP (Orlitzky, Schmidt, and Rynes 2003, Lu et al. (2014), Busch and Friede (2018)). Scholars have mainly adopted three broad subdivisions of CFP: market-based (investor returns), accounting-based (accounting returns), and perceptual (survey) measures. Market-based measures (e.g. price-earning ratio, Tobin's Q, or share price appreciation) consider that returns should be measured from the perspective of the shareholders (Cochran and Wood 1984). Accounting-based measures require profitability and asset utilization indicators such as Return on Asset (i.e. ROA) or Return on Equity (i.e. ROE) (Cochran and Wood 1984, Wu (2006)). Finally perceptual measures of CFP is a more subjective approach based on the perception of survey respondents (Lu et al. 2014).

CEP is also a broad meta-constructs and no common definition exist in the literature (Albertini 2013, Endrikat, Guenther, and Hoppe (2014)). Scholars have used a wide variety of indicators as proxies for approaching the green performance of companies. Albertini (2013) use a three-group classification to summarize CEP measures : (i) Environmental Management Measures (i.e. EMV) which mostly refer to environmental strategy, integration of environmental issues into strategic planning processes, environmental practices, process-driven initiatives, product-driven management systems, ISO 14001 certification, environmental management system adoption, and participation in voluntary programs (Molina-Azorín et al. 2009, Schultze and Trommer (2012)). (ii) Environmental Performance Variables (i.e. EPV) which are mostly measures quantified in physical units (carbon dioxide emissions, physical waste, water consumption, toxic release) that can be positive (emission reduction) or negative (emission generated) (Albertini 2013). (iii) Environmental Disclosure Variables (i.e. EDV) such as information releases regarding toxic emission (Hamilton 1995), environmental awards (Chen, Nginiatedema, and Li 2018), environmental accidents and crises (Blacconiere and Patten 1994), and environmental investment announcements (Gilley et al. 2000). Endrikat, Guenther, and Hoppe (2014) split up CEP into two sub-dimensions, namely (i) process-based CEP which can be linked to the EMV approach of Albertini (2013) and (ii) outcome-based CEP which can be linked to the EPV dimension. According to Xie and Hayase (2007), process-based

CEP can be considered as a preliminary step of outcome-based CEP. Scholars demonstrated that the first approach have a positive impact on the second one which in turn has a positive impact on financial performance (Li, Nginiatedema, and Chen 2017, Chen, Nginiatedema, and Li (2018)).

Although recent recent meta-analyses (Orlitzky and Benjamin 2001, Orlitzky, Schmidt, and Rynes (2003), Wu (2006), Albertini (2013), Dixon-Fowler et al. (2013), Endrikat, Guenther, and Hoppe (2014), Lu et al. (2014), Wang, Dou, and Jia (2016), Busch and Friede (2018)) have demonstrated the positive link between CEP and CFP, some scholars advanced that the multidimensionality of both CEP and CFP constructs are one reason why the conclusion of the relationship between CEP and CFP have been so mixed (Albertini 2013, Endrikat, Guenther, and Hoppe (2014), Miroshnychenko, Barontini, and Testa (2017)). For instance, Busch and Hoffmann (2011) found that process-based CEP (in terms of carbon management) negatively affects CFP, while outcome-based CEP (in terms of carbon emissions) has a positive influence on CFP. Cavaco and Crifo (2014) and Muhammad et al. (2015) have used both accounting-based indicators (i.e. ROA) and market-based indicators (i.e. Tobin's Q) as a proxy for CFP and got a positive relation between ROA and CEP while no relation between Tobin's Q and CEP. A general consensus have shown that accounting-based CFP are characterized by a stronger relation to CEP than market-based and perceptual indicators (Orlitzky, Schmidt, and Rynes 2003, Wu (2006), Albertini (2013), Lu et al. (2014), Busch and Friede (2018)).

Considering the varying findings with regards to process-based CEP and outcome-based CEP and with a motivation to answer the call of Endrikat, Guenther, and Hoppe (2014), I hypothesize the following :

Hypothesis 1. Process-based CEP have a positive impact on Outcome-based CEP

Hypothesis 2. Outcome-based CEP have a positive impact on CFP

Hypothesis 3. Process-based CEP have a positive impact on CFP

1.4 When does it pay to be green?

Griffin and Mahon (1997) was the first to call for research that looks at the CEP-CFP relation over time. While scholars had been mainly answering the question *“Does it pay to be green?”* some have recently tried to move forward and gained interest in answering the call of Griffin and Mahon (1997) with the following question : *“When does it pay to be green?”* (Manrique and Martí-Ballester 2017).

Zhang and Chen (2017) have shown that CEP has a negative relationship with short-term financial performance and a positive relationship with long-term CFP. Delmas, Nairn-Birch,

and Lim (2015) observed that the more a firm decreases carbon emissions the more positive the investors perceptions of future market performance and the lower its short term financial performance. Song, Zhao, and Zeng (2017) have shown that corporate environmental management has a significant positive correlation with future financial performance, however it has no significant correlation with current financial performance. Manrique and Martí-Ballester (2017) demonstrated that in times of economic crisis firms which improve their corporate environmental performance improve their corporate financial performance, this effect being weaker for firms in developed countries, where only the short-term corporate financial performance improves, than for firms in emerging and developing countries, where the short- and long-term corporate financial performance improve. Chen, Ngniatedema, and Li (2018) have shown that a firms green performance not only impact an organization's financial performance in that particular year but also impact the year that follows.

Those empirical results provide evidences that no common consensus have be found yet to answer the question “*When does it pay to be green?*”. Busch and Friede (2018) demonstrated that at a meta-research level, the evidence of a time dependency on the CEP-CFP link is not significant and that the call of Griffin and Mahon (1997) remains to date unanswered.

To capture the time dimension in the CFP-CEP nexus, scholars consider accounting-based measures as a proxy for short term CFP and market-based measures as a proxy for long term CFP (Endrikat, Guenther, and Hoppe 2014, Delmas, Nairn-Birch, and Lim (2015), Zhang and Chen (2017), Manrique and Martí-Ballester (2017), Miroshnychenko, Barontini, and Testa (2017)). According to Endrikat, Guenther, and Hoppe (2014) :

“While accounting-based measures may capture immediate impacts, they may not appropriately account for intangible and long-term effects which are likely to be involved in the CEP-CFP link. Market-based measures, on the other hand, integrate estimations of a firm's future prospects and reflect the notion of external stakeholders (primarily investors) (Orlitzky, Schmidt, and Rynes 2003, Peloza (2009), Delmas and Nairn-Birch (2011)). Thus, market-based measures may better to capture the long-term value of certain environmental activities.”

Taking into account theoretical arguments and empirical findings and in order to move forward in answering the call of Griffin and Mahon (1997), I hypothesize the following :

Hypothesis 4. CEP have a stronger impact on short term CFP than on long term CFP

2 Research Framework

Based on the literature review I have developed four hypotheses. My research framework is summarized in the [Figure 2.1](#). The latter, inspired by Li Suhong, Nginiatedema Thomas, and Chen Fang (2017) and Chen, Nginiatedema, and Li (2018), aims at answering three calls. Firstly Endrikat, Guenther, and Hoppe (2014) have highlight the need for a better understanding of the multidimensionality of both CEP and CFP constructs. To do that I will examine the combined effects of process-based and output-based CEP on both accounting-based and market-based measures of CFP. Secondly, to the best of my knowledge, Li Suhong, Nginiatedema Thomas, and Chen Fang (2017) and Chen, Nginiatedema, and Li (2018) were the first scholars to use the NewsWeek Green Ranking as a proxy for both process-based and output-based CEP and performed their analysis with a time frame of one year. Therefore apply a longitudinal study on this new database can help to provide a better understanding of the CEP-CFP nexus. Lastly, Busch and Friede (2018) claimed that to date and at a meta-research level, the call of Griffin and Mahon (1997) regarding the research that looks at the CEP-CFP relation over time remains unanswered and confused. Therefore capturing the short term vs long term CFP through the use of accounting-based and market-based measures could help to collect data for future meta-analysis.

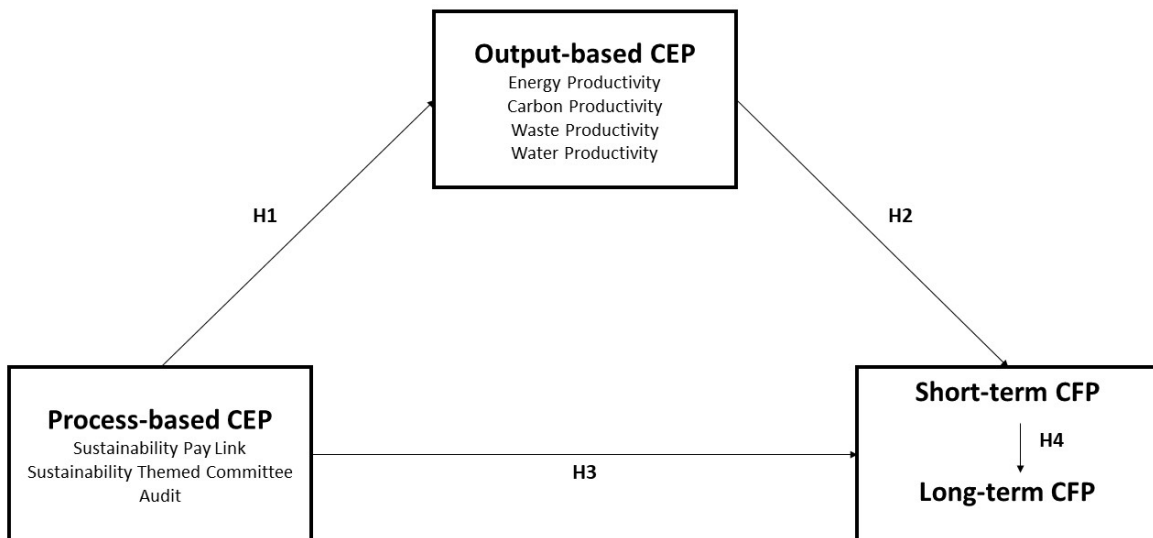


Figure 2.1: Research Framework

3 Data

3.1 Overview

The starting point of my data collection was the Newsweek Green Ranking which had assessed the world's largest publicly-traded companies in the US and in the world since 2009. This ranking had been developed through a collaboration between Newsweek, Corporate Knights Capital, HIP Investor Inc and leading sustainability minds from nongovernmental organizations and the academic and accounting communities. The ranking attribute an overall green score to companies. The score is based on a weighted average of key performance indicators (KPI's). This study uses these KPIs to measure both process-based and outcome-based of the 500 largest publicly-traded companies in the United States. Due to a methodology change² in the 2014 Newsweek Green Rankings, only the 2014, 2015 and 2016 ranking were considered. Among those three ranking and of the 500 US companies, 405 companies were listed for each years.

Even though green rankings were published in 2014, 2015 and 2016, each company is evaluated based on the 2012, 2013 and 2014 data. Therefore, measures for financial performance of companies will be based on the 2012, 2013 and 2014 fundamental data. Financial data have been mainly collected on [Stockpup](#) and in case of missing values I have completed with [Morningstar](#) and [Ycharts](#). Of the 405 initial companies, a total of 8 companies were dropped because of missing data. The final sample includes 397 publicly-traded companies in the US covering the period from 2012 till 2014 inclusively.

[Table 3.1](#) describes my variables and following sections deeply explained each variables.

3.2 Dependent Variables

Regarding dependent variables, Endrikat, Guenther, and Hoppe (2014) claim that accounting-based measures (e.g. ROA, ROE, Return on Sales) capture immediate impacts and can be used as a proxy to measure short-term CFP while market-based measures (e.g. Tobin's Q, market capitalization, market to book value) integrate estimations of a firm's future prospects and can be better used as a proxy for long-term CFP. Among scholars that used both measures simultaneously, ROA and Tobin's Q are the ones that have been used the most frequently (Lioui and Sharma 2012, Cavaco and Crifo (2014), Muhammad et al. (2015), Delmas, Nairn-Birch, and Lim (2015), Semenova and Hassel (2016), Manrique and Martí-Ballester (2017)).

²The GICS classification is composed of eleven industry sectors, namely : Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Pharmaceuticals / Biotechnology, Telecommunication Services and Utilities.

Therefore I have decided to use ROA and Tobin's Q as a proxy for both short and long-term CFP.

ROA is a standard accounting measure of financial performance, which is calculated by dividing earnings before interest by total firm assets. Tobin's Q is defined as the ratio of the market value of a firm to the replacement cost of its assets (Chung and Pruitt 1994). Broadly speaking, firms displaying Tobin's Q greater than one are judged as using scarce resources effectively and those with Tobin's Q less than one as using resources poorly (Lewellen and Badrinath 1997). In other words investors prefers companies with Tobin's Q superior to one. Due to the complexity of calculating the replacement cost of a firm, the literature have seen several attempts to approximate Tobin's Q (Perfect and Wiles 1994). Tobin's Q value had been directly collected on Ycharts and this platform use the simple approximation of Chung and Pruitt (1994) which is summarized in [Equation 1](#).

$$Tobin's Q = \frac{MVE + PS + DEBT}{TA} \quad (1)$$

where MVE is the product of a firm's shares prices and the number of common stock shares outstanding, PS is the liquidating value of the firm's outstanding preferred stock, $DEBT$ is the value of the firm's short term liabilities net of its short-term assets, plus the book value of the firm's long-term debt and TA is the book value of the total assets of the firms.

[Table 3.2](#) contains a sample of my database. Some missing values appears in the TobinsQ column. Compared to ROA, calculating Tobin's Q requires a relatively high number of financial variables and is more susceptible to missing values. This creates a disparity among the number of observations for each dependent variables. Delmas, Nairn-Birch, and Lim (2015) encountered the same issue and conducted an identical analysis to check whether this introduces sample bias. **Therefore I will do the same and depending on the robustness of results I will use one or two sample spaces in my study. I still need to figure out how to perform this test in R.**

3.3 Independent Variables

Concerning independent variables, both process-based and outcome-based CEP had been approached with the KPI's of the Newsweek Green Ranking. More precisely, I have used “Sustainability Pay Link”, “Sustainability Themed Committee”, and “Audit” as a proxy for process-based CEP and “Energy Productivity”, “Carbon Productivity”, “Water Productivity” and “Waste Productivity” as a proxy for outcome-based CEP.

A Sustainability Pay Link is a mechanism to link the remuneration of any member of a company's senior executive team with the achievement of environmental performance targets. A score of 100% accrues to the company when such a link exists and a score of 0% is attributed if there is no such link in place.

A Sustainability Themed Committee refers to the existence of a committee at the board of directors level whose mandate is related to the sustainability of the company, including but not limited to environmental matters. A score of 100% accrues to the company when such a link exists and a score of 0% is attributed if there is no such link in place.

An Audit refers to the case where a company provides evidence that the latest reported environmental metrics were audited by a third party. A score of 100% if such an audit has been performed, and a score of 0% is given when such audit was not performed.

Energy Productivity (i.e. EnP), Carbon Productivity (i.e. CaP), Water Productivity (i.e. WatP) and Waste Productivity (i.e. WastP) are calculated through equation 2, 3, 4 and 5.

$$EnP = \frac{Revenue}{TEC} \quad (2)$$

$$CaP = \frac{Revenue}{TGGE} \quad (3)$$

$$WatP = \frac{Revenue}{TW} \quad (4)$$

$$WastP = \frac{Revenue}{(TWG - TWRR)} \quad (5)$$

where *Revenue* is the total revenue in US\$, *TEC* is the total energy consumption, *TGGE* is the total greenhouse gaz emissions in *co*₂, *TW* is the total water in *m*₃, *TWG* is the total waste generated in metric tons and *TWRR* is the total waste recycled and reused in metric tons.

3.4 Control Variables

Several scholars (Telle 2006, McWilliams, Siegel, and Wright (2006), Surroca, Tribó, and Waddock (2010)) have argued that misspecified models may be the reason for the inconsistency of the empirical results in the CEP-CFP nexus. In order to improve the construct and to avoid the endogeneity issue due to omitted variables (Roberts and Whited 2013), Endrikat, Guenther, and Hoppe (2014) have highlighted potential determinants of the relationship between CEP and CFP : firm size, industry sector, financial risk, R&D activities, advertising intensity and capital structure (i.e leverage). In a meta-analysis study, Lu et al. (2014) argued that growth rate is equally important. Consequently this study use those seven variables control.

The common way to approach *firm size* is to use the natural logarithm of total assets (Delmas, Nairn-Birch, and Lim 2015, Miroshnychenko, Barontini, and Testa (2017)). To approach the company *industry sector* I use the Global Industry Classification Standard (GICS)³. A dummy for each industry sector had been included in the model. The Beta/Jensen's alpha (**to be defined**) is adopted as aproxy for *financial risk*. *Capital structure* is approximated with the ratio of long-term debt to common shareholders' equity (shareholders equity minus preferred equity). *R&D activities* had been measured as ... (**see Ycharts**). *Advertising intensity* had been... (**see when find a way to get those data**)

³The GICS classification is composed of eleven industry sectors, namely : Consumer Discretionary, Consumer Staples, Energy, Financials, Health Care, Industrials, Information Technology, Materials, Pharmaceuticals / Biotechnology, Telecommunication Services and Utilities.

Table 3.1: Variable Definition

	Variables	Description
1	Tobin's Q	The ratio of a firm's market value to the replacement cost of its assets
2	Return on Asset	Earnings before interest over total firm assets
3	Energy Productivity	Revenue (\$US) / Total Energy Consumption
4	Carbon Productivity	Revenue (\$US) / Total Greenhouse gas Emissions (CO2)
5	Water Productivity	Revenue (\$US) / Total water (m3)
6	Waste Productivity	Revenue (\$US) / [Total waste generated (metric tonnes)–waste recycled/reused (tones)]
7	Sustainability Pay Link	A mechanism to link the remuneration of any member of a company's senior executive team with the achievement of environmental performance targets. The existence of such a link is awarded a score of 100%. A score of 0% is attributed if there is no such mechanism in place
8	Sustainable Themed Commitment	Refers to the existence of a committee at the Board of Directors level whose mandate is related to the sustainability of the company, including but not limited to environmental matters. A score of 100% accrues to the company when such link exists and a score of 0% is attributed if there is no such link in place
9	Audit Score	Refers to the case where a company provides evidence that the latest reported environmental metrics were audited by a third party. Newsweek and their research partners award a score of 100% if such audit has been performed, and a score of 0% is given when such audit was not performed.
10	Capital Structure	The ratio of long-term debt to common shareholders' equity (shareholders equity minus preferred equity)
11	Growth	The ratio of earnings to revenue
12	Firm Size	Log of total assets
13	Industry	Global Industry Classification Standard (GICS) of the firm. The variable take a value from 1 to 10 where 1 = Consumer Discretionary, 2 = Consumer Staples, 3 = Energy, 4 = Financials, 5 = Health Care, 6 = Industrials, 7 = Information Technology, 8 = Materials, 9 = Pharmaceuticals / Biotechnology, 10 = Telecommunication Services and 11 = Utilities

Table 3.2: Sample selection of the database

	Companies	YearFinancialIndicator	ROA	TobinsQ
1-2013	1	2013	0.07	1.07
1-2014	1	2014	0.05	1.03
1-2015	1	2015	0.05	1.54
2-2013	2	2013	0.08	0.36
2-2014	2	2014	0.06	
2-2015	2	2015	0.06	
3-2013	3	2013	0.18	1.42
3-2014	3	2014	0.19	1.53
3-2015	3	2015	0.19	1.63
4-2013	4	2013	0.06	2.18

4 Methodology

4.1 Econometric model

Panel data is a common approach to address the CFP-CEP nexus (Albertini 2013). Panel data, also called longitudinal data or cross-sectional time-series data include observations on N cross section units (i.e., firms) over T time-periods (Hsiao 2007a). As panel data analysis use variation in both these dimensions, it is considered to be one of the most efficient analytical methods for data (Dimitrios Asteriou 2006). It usually contains more degrees of freedom, less collinearity among the variables, more efficiency and more sample variability than one-dimensional method (i.e. cross-sectional data and time series data) giving a more accurate inference of the parameters estimated in the model (Hsiao 2007b, Hsiao (2014)). Roberts and Whited (2013) also argued that using panel data offer a partial, but by no means complete and costless, solution to the problem of omitted variables in model, namely the most common causes of endogeneity in empirical corporate finance. Consequently this study use equation 6 to test the combined effect of process and outcome-based CEP on CFP.

$$\begin{aligned}
 Y_{it+1} = & \beta_0 + \beta_1(SPL_{it}) \\
 & + \beta_2(STC_{it}) + \beta_3(A_{it}) \\
 & + \beta_4(EnP_{it}) + \beta_5(CaP_{it}) \\
 & + \beta_6(WatP_{it}) + \beta_7(WasP_{it}) \\
 & + (Controls_{it}) + \varepsilon_{it}
 \end{aligned} \tag{6}$$

where Y_{it+1} is a proxy of CFP measured as ROA or Tobin's Q, SPL_{it} is a proxy for a firm's sustainability pay link, STC_{it} is a proxy for a firm's sustainability themed commitment, A_{it} is a proxy for a firm's audit score, EP_{it} is a proxy for a firm's energy productivity, CP_{it} is a proxy for a firm's carbon productivity, $WatP_{it}$ is a proxy for a firm's water productivity, $WasP_{it}$ is a proxy for a firm's waste productivity, $Controls_{it}$ is a vector of control variables that include firm size, industry sector, financial risk, R&D activities, advertising intensity and capital structure and lastly ε_{it} which is the error term.

Panel data setting implies that endogeneity occurs in cases where the independent variable in a regression model is correlated with the error term, or due to simultaneous causality between the dependent and the independent variable (Sánchez-Ballesta and García-Meca 2007, Biørn and Krishnakumar (2008), Roberts and Whited (2013)). Consequently, the presence of endogeneity implies that the fourth and fifth assumptions of OLS⁴ are violated and scholars

⁴Five assumptions are required to produce consistent estimators with OLS : (i) a random sample of observations on y and (x_1, \dots, x_n) , (ii) a mean zero error term, (iii) no linear relationship among the explanatory

have to used a different method to produce consistent estimators (Wooldridge 2008, Roberts and Whited (2013)). Recent meta-analysis provided evidences that the CFP-CEP nexus is characterized by a bidirectional causality (Orlitzky and Benjamin 2001, Orlitzky, Schmidt, and Rynes (2003), Wu (2006), Albertini (2013), Dixon-Fowler et al. (2013), Endrikat, Guenther, and Hoppe (2014), Lu et al. (2014), Wang, Dou, and Jia (2016), Busch and Friede (2018)). In order to adress potential endogeneity problems in my model, firstly, I have lagged observations in dependent and control variables one year behind financial performance. This method allows to increase the confidence of the direction of the relationship (Hart and Ahuja 1996, Delmas, Nairn-Birch, and Lim (2015), Miroshnychenko, Barontini, and Testa (2017)) and *in fine* reduce the simultaneity bias. Secondly, given that the standard Hausman test had rejected the null hypothesis of random effect (see Annex... for results of the test) I use a fixed effect model to regress 6. According to Roberts and Whited (2013), fixed effect model ameliorate endogeneity concerns.

4.2 Sensitivity Analysis

For the sensitivity analysis, let's make as (Miroshnychenko, Barontini, and Testa 2017), namely take ROE as an other accounting based indicators and I need to find an other market based indicator.

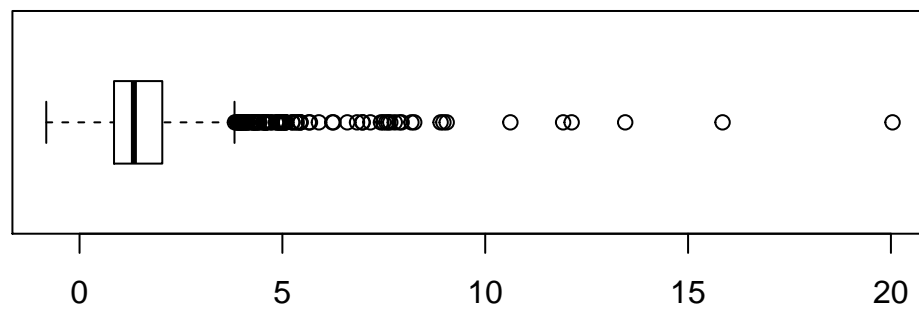
variables, (iv) an error term that is uncorrelated with each explanatory variables and (v) an error term with zero mean conditional on the explanatory variables.

5 Results

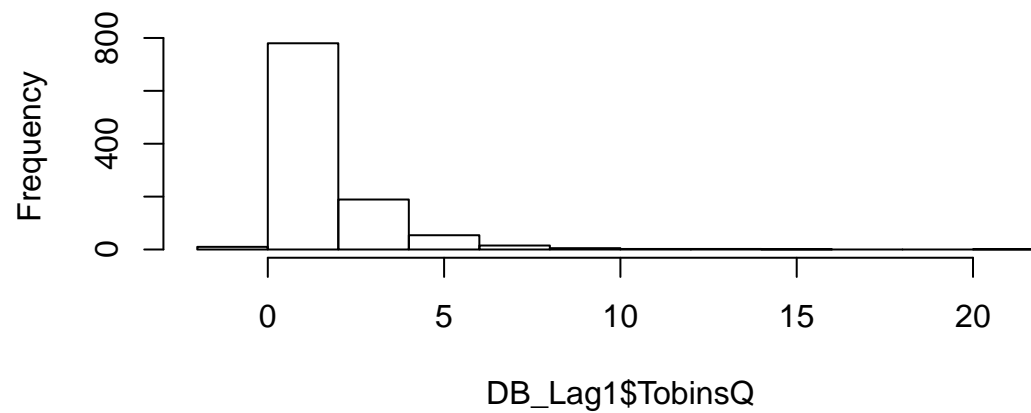
5.1 Descriptive Statistics

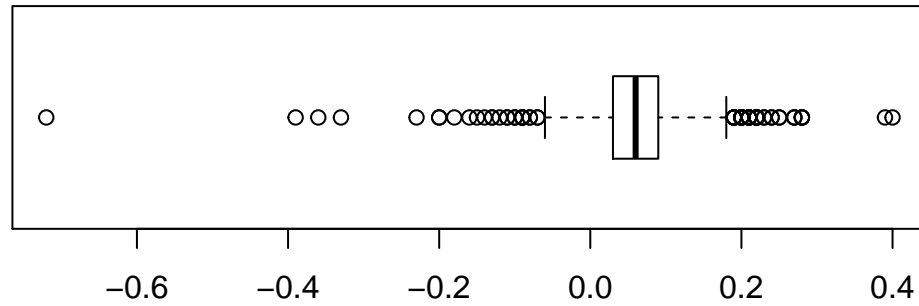
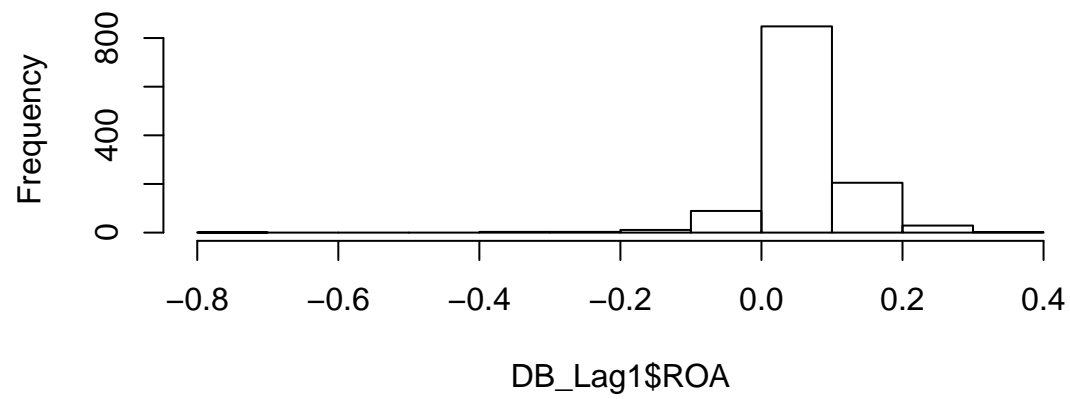
5.2 Some boxplots and histogram

Boxplot TobinsQ

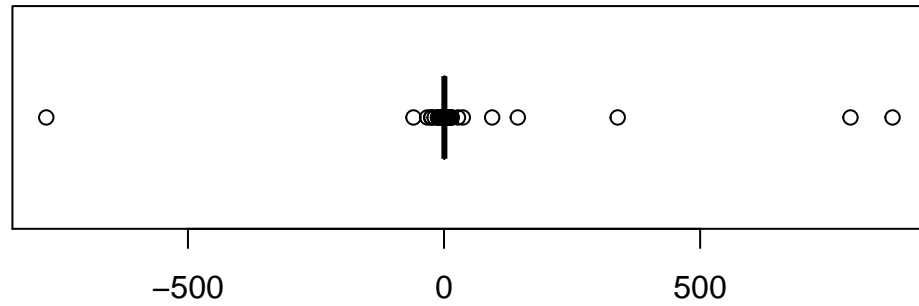


Hist TobinsQ

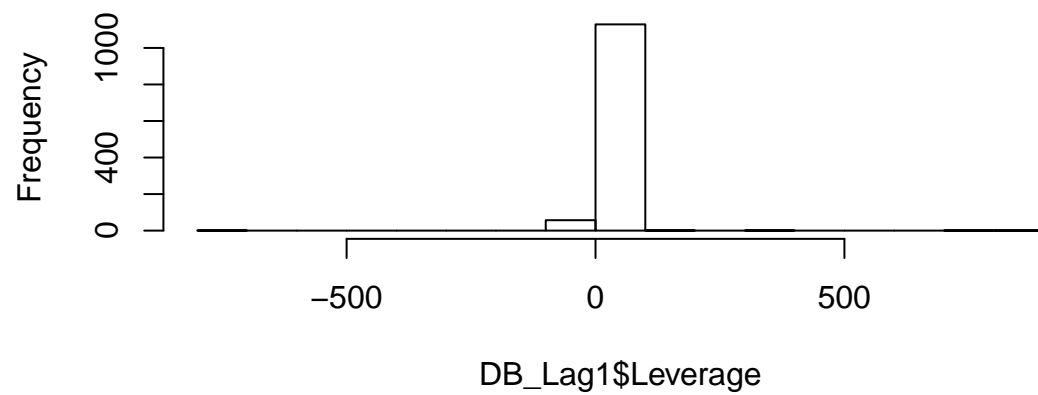


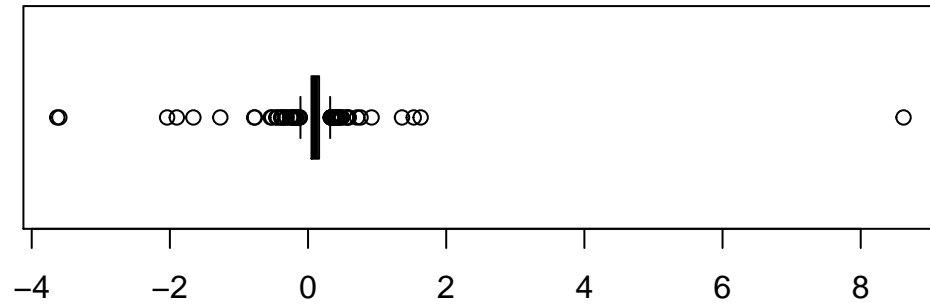
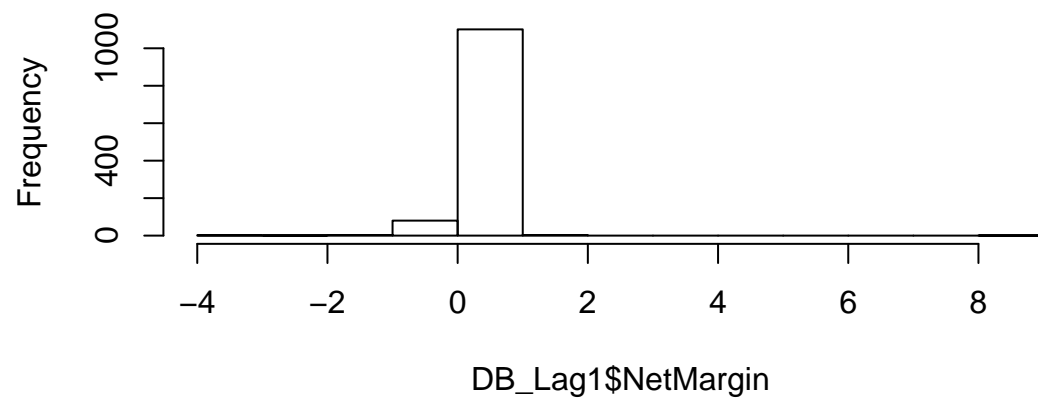
Boxplot ROA**Hist ROA**

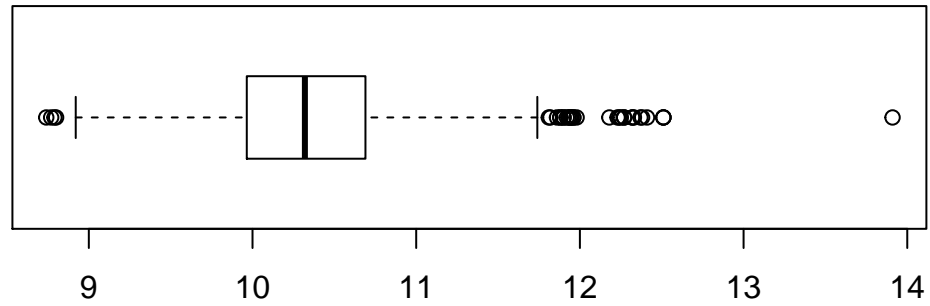
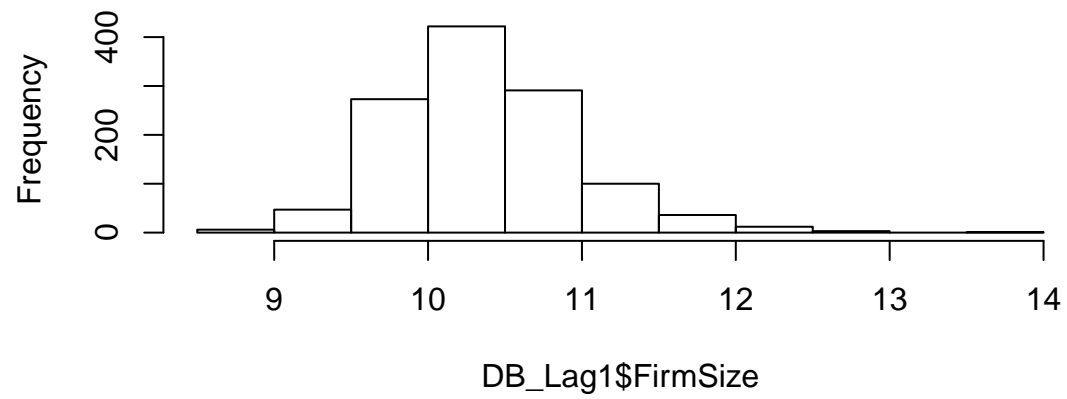
Boxplot Leverage



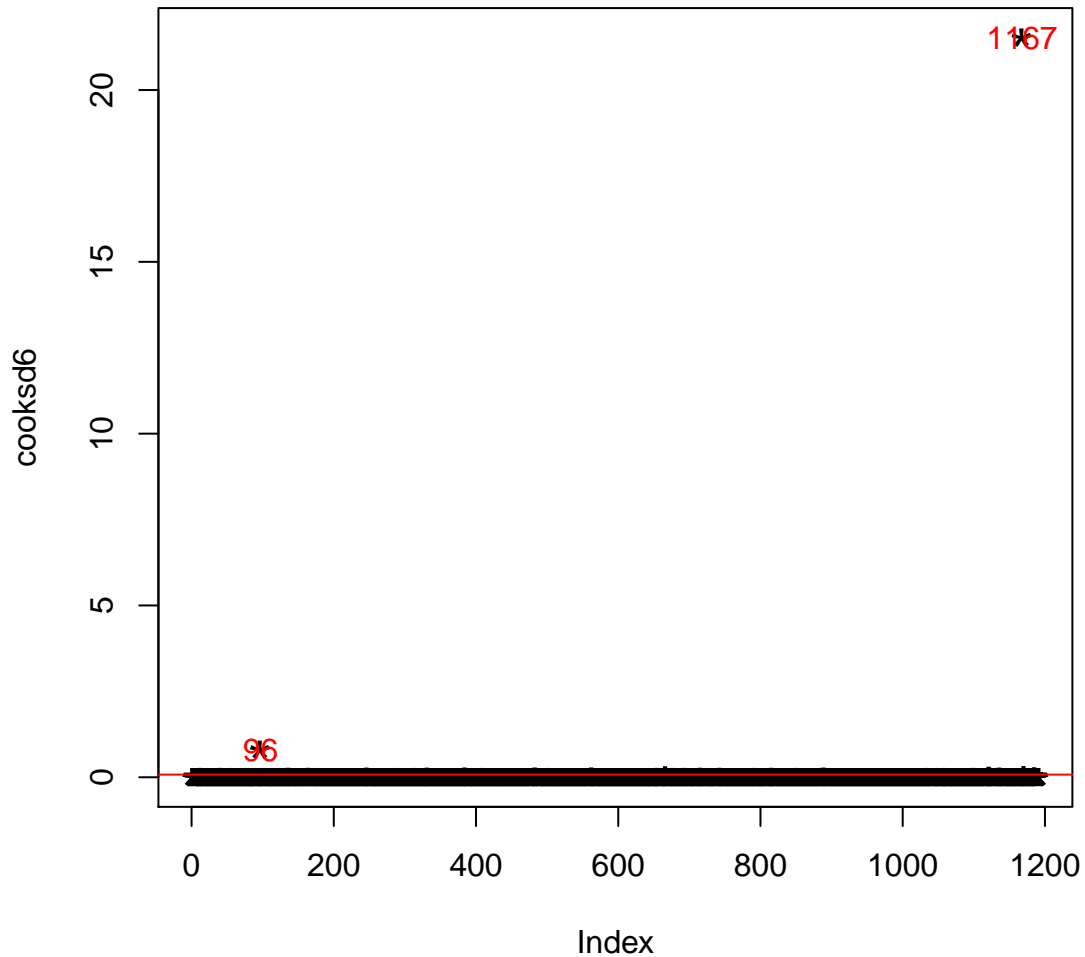
Hist Leverage



Boxplot NetMargin**Hist NetMargin**

Boxplot FirmSize**Hist FirmSize**

Influential Obs by Cooks distance – M6



Here the function `outlierTest` from *car* package gives the most extreme observation based on the given model. **Should I remove those observations from my database?**

##		rstudent	unadjusted p-value	Bonferonni p
##	1167	-16.538226	2.0854e-55	2.4837e-52
##	96	-9.115733	3.2778e-19	3.9039e-16
##	384	-7.452510	1.7677e-13	2.1053e-10
##	483	5.266361	1.6530e-07	1.9688e-04
##	1121	-5.254983	1.7561e-07	2.0915e-04
##	1170	-5.226888	2.0378e-07	2.4270e-04
##	482	5.109215	3.7710e-07	4.4913e-04

Results

## 562	-4.415030	1.1027e-05	1.3133e-02
## 1122	-4.412766	1.1141e-05	1.3269e-02
##	rstudent	unadjusted p-value	Bonferonni p
## 564	12.099145	1.2389e-31	1.3120e-28
## 563	8.665168	1.6889e-17	1.7885e-14
## 562	6.693406	3.5491e-11	3.7585e-08
## 1122	6.246067	6.1126e-10	6.4732e-07
## 1135	6.159497	1.0393e-09	1.1006e-06
## 1121	6.006707	2.6097e-09	2.7637e-06
## 923	5.428052	7.0805e-08	7.4983e-05
## 688	5.001849	6.6562e-07	7.0489e-04
## 924	4.372898	1.3486e-05	1.4282e-02

6 Discussion

Let's speak...

Conclusion

This is my conclusion. . .

Appendix

Appendix A : This is an appendix a

Appendix B : This is an appendix b

References

- Albertini, Elisabeth. 2013. "Does Environmental Management Improve Financial Performance? A Meta-Analytical Review." *Organization & Environment* 26 (4): 431–57.
- Ambec, S., and P. Lanoie. 2008. "Does It Pay to Be Green? A Systematic Overview." *Academy of Management Perspectives* 22 (4): 45–62. <http://fdi.idei.fr/wp-content/uploads/2011/02/Does-it-Pay-to-be-Green.-A-Systematic-Overview.pdf>.
- Berchicci, Luca, and Andrew King. 2007. "11 Postcards from the Edge." *The Academy of Management Annals* 1 (1): 513–47. doi:[10.1080/078559816](https://doi.org/10.1080/078559816).
- Bénabou, Roland, and Jean Tirole. 2006. "Incentives and Prosocial Behavior." *The American Economic Review* 96 (5): 1652–78. doi:[10.1257/000282806779396283](https://doi.org/10.1257/000282806779396283).
- Biørn, Erik, and Jayalakshmi Krishnakumar. 2008. "Measurement Errors and Simultaneity." In *The Econometrics of Panel Data*, 323–67. Springer.
- Blacconiere, Walter G., and Dennis M. Patten. 1994. "Environmental Disclosures, Regulatory Costs, and Changes in Firm Value." *Journal of Accounting and Economics* 18 (3): 357–77.
- Busch, Timo, and Gunnar Friede. 2018. "The Robustness of the Corporate Social and Financial Performance Relation: A Second-Order Meta-Analysis: Corporate Social and Financial Performance." *Corporate Social Responsibility and Environmental Management*, March. doi:[10.1002/csr.1480](https://doi.org/10.1002/csr.1480).
- Busch, Timo, and Volker H. Hoffmann. 2011. "How Hot Is Your Bottom Line? Linking Carbon and Financial Performance." *Business & Society* 50 (2): 233–65. doi:[10.1177/0007650311398780](https://doi.org/10.1177/0007650311398780).
- Cavaco, Sandra, and Patricia Crifo. 2014. "CSR and Financial Performance: Complementarity Between Environmental, Social and Business Behaviours." *Applied Economics* 46 (27): 3323–38. doi:[10.1080/00036846.2014.927572](https://doi.org/10.1080/00036846.2014.927572).
- Chen, Fang, Thomas Nginiatedema, and Suhong Li. 2018. "A Cross-Country Comparison of Green Initiatives, Green Performance and Financial Performance." *Management Decision*, February. doi:[10.1108/MD-08-2017-0761](https://doi.org/10.1108/MD-08-2017-0761).
- Chung, Kee H., and Stephen W. Pruitt. 1994. "A Simple Approximation of Tobin's Q." *Financial Management*, 70–74.
- Cochran, Philip L., and Robert A. Wood. 1984. "Corporate Social Responsibility and

- Financial Performance.” *Academy of Management Journal* 27 (1): 42–56.
- Delmas, Magali A., and Nicholas S. Nairn-Birch. 2011. “Is the Tail Wagging the Dog? An Empirical Analysis of Corporate Carbon Footprints and Financial Performance.”
- Delmas, Magali A., Nicholas Nairn-Birch, and Jinghui Lim. 2015. “Dynamics of Environmental and Financial Performance: The Case of Greenhouse Gas Emissions.” *Organization & Environment* 28 (4): 374–93. <https://pdfs.semanticscholar.org/cbe5/48cbdb9e569de3c79bad22f1f02442374ac8.pdf>.
- Dimitrios Asteriou. 2006. *Applied Econometrics*. <http://www.macmillanihe.com/page/detail/Applied-Econometrics/?K=9781137415462>.
- Dixon-Fowler, Heather R., Daniel J. Slater, Jonathan L. Johnson, Alan E. Ellstrand, and Andrea M. Romi. 2013. “Beyond ‘Does It Pay to Be Green?’ A Meta-Analysis of Moderators of the CEP Relationship.” *Journal of Business Ethics* 112 (2): 353–66. http://libres.uncg.edu/ir/asu/f/Fowler_Dixon_Heather_2013_Pay_to_be_green.pdf.X.pdf.
- Dowell, Glen, Stuart Hart, and Bernard Yeung. 2000. “Do Corporate Global Environmental Standards Create or Destroy Market Value?” *Management Science* 46 (8): 1059–74.
- Elliott, Larry. 2015. “Carney Warns of Risks from Climate Change ‘Tragedy of the Horizon’” *The Guardian*. September 29. <http://www.theguardian.com/environment/2015/sep/29/carney-warns-of-risks-from-climate-change-tragedy-of-the-horizon>.
- Endrikat, Jan, Edeltraud Guenther, and Holger Hoppe. 2014. “Making Sense of Conflicting Empirical Findings: A Meta-Analytic Review of the Relationship Between Corporate Environmental and Financial Performance.” *European Management Journal* 32 (5): 735–51. doi:10.1016/j.emj.2013.12.004.
- Freeman, R. Edward. 1984. “Strategic Management: A Stakeholder Approach.” *Advances in Strategic Management* 1 (1): 31–60.
- Friedman, Milton. 1970. “The Social Responsibility of Business Is to Increase Its Profits.” *The New York Times Magazine*, September 13. <https://www.colorado.edu/studentgroups/libertarians/issues/friedman-soc-resp-business.html>.
- Gilley, K. Matthew, Dan L. Worrell, Wallace N. Davidson III, and Abuzar El-Jelly. 2000. “Corporate Environmental Initiatives and Anticipated Firm Performance: The Differential Effects of Process-Driven Versus Product-Driven Greening Initiatives.” *Journal of Management* 26 (6): 1199–1216.
- Griffin, Jennifer J., and John F. Mahon. 1997. “The Corporate Social Performance and Corporate Financial Performance Debate: Twenty-Five Years of Incomparable Research.”

Business & Society 36 (1): 5–31.

Hamilton, James T. 1995. “Pollution as News: Media and Stock Market Reactions to the Toxics Release Inventory Data.” *Journal of Environmental Economics and Management* 28 (1): 98–113.

Hart, Stuart L. 1995. “A Natural-Resource-Based View of the Firm.” *Academy of Management Review* 20 (4): 986–1014. doi:[10.5465/AMR.1995.9512280033](https://doi.org/10.5465/AMR.1995.9512280033).

Hart, Stuart L., and Gautam Ahuja. 1996. “Does It Pay to Be Green? An Empirical Examination of the Relationship Between Emission Reduction and Firm Performance.” *Business Strategy and the Environment* 5 (1): 30–37.

Hoffman, Andrew J. 2005. “Climate Change Strategy: The Business Logic Behind Voluntary Greenhouse Gas Reductions.” *California Management Review* 47 (3): 21–46. doi:[10.2307/41166305](https://doi.org/10.2307/41166305).

Houghton, John T., and Intergovernmental Panel on Climate Change. 1996. *Climate Change 1995: The Science of Climate Change: Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

Hsiao, Cheng. 2007a. “Panel Data Analysis advantages and Challenges.”

———. 2007b. “Panel Data Analysis advantages and Challenges.” *TEST* 16 (1): 1–22. doi:[10.1007/s11749-007-0046-x](https://doi.org/10.1007/s11749-007-0046-x).

———. 2014. “Chapitre 5 : Panel Data Models.” In *Analysis of Panel Data*. 54. Cambridge university press.

Jean Jouzel. 2017. “Luxembourg Sustainability Forum 2017 - Jean Jouzel, Les Enjeux Du Réchauffement Climatique.”

Lewellen, Wilbur G., and Swaminathan G. Badrinath. 1997. “On the Measurement of Tobin’s Q.” *Journal of Financial Economics* 44 (1): 77–122.

Li, Suhong, Thomas Nginiatedema, and Fang Chen. 2017. “Understanding the Impact of Green Initiatives and Green Performance on Financial Performance in the US.” *Business Strategy and the Environment*, January, n/a–n/a. doi:[10.1002/bse.1948](https://doi.org/10.1002/bse.1948).

Li Suhong, Nginiatedema Thomas, and Chen Fang. 2017. “Understanding the Impact of Green Initiatives and Green Performance on Financial Performance in the US.” *Business Strategy and the Environment* 26 (6): 776–90. doi:[10.1002/bse.1948](https://doi.org/10.1002/bse.1948).

Lioui, Abraham, and Zenu Sharma. 2012. “Environmental Corporate Social Responsibility

- and Financial Performance: Disentangling Direct and Indirect Effects.” *Ecological Economics* 78 (June): 100–111. doi:[10.1016/j.ecolecon.2012.04.004](https://doi.org/10.1016/j.ecolecon.2012.04.004).
- Lu, Weisheng, K. W. Chau, Hongdi Wang, and Wei Pan. 2014. “A Decade’s Debate on the Nexus Between Corporate Social and Corporate Financial Performance: A Critical Review of Empirical Studies 2002–2011.” *Journal of Cleaner Production* 79 (September): 195–206. doi:[10.1016/j.jclepro.2014.04.072](https://doi.org/10.1016/j.jclepro.2014.04.072).
- Majumdar, Sumit K., and Alfred A. Marcus. 2001. “Rules Versus Discretion: The Productivity Consequences of Flexible Regulation.” *Academy of Management Journal* 44 (1): 170–79. doi:[10.2307/3069344](https://doi.org/10.2307/3069344).
- Manrique, Sergio, and Carmen-Pilar Martí-Ballester. 2017. “Analyzing the Effect of Corporate Environmental Performance on Corporate Financial Performance in Developed and Developing Countries.” *Sustainability* 9 (11): 1957. doi:[10.3390/su9111957](https://doi.org/10.3390/su9111957).
- McWilliams, Abigail, Donald S. Siegel, and Patrick M. Wright. 2006. “Corporate Social Responsibility: Strategic Implications.” *Journal of Management Studies* 43 (1): 1–18.
- Miroshnychenko, Ivan, Roberto Barontini, and Francesco Testa. 2017. “Green Practices and Financial Performance: A Global Outlook.” *Journal of Cleaner Production* 147 (Supplement C): 340–51. doi:[10.1016/j.jclepro.2017.01.058](https://doi.org/10.1016/j.jclepro.2017.01.058).
- Molina-Azorín, José F., Enrique Claver-Cortés, Maria D. López-Gamero, and Juan J. Tarí. 2009. “Green Management and Financial Performance: A Literature Review.” *Management Decision* 47 (7): 1080–1100.
- Muhammad, Noor, Frank Scrimgeour, Krishna Reddy, and Sazali Abidin. 2015. “The Relationship Between Environmental Performance and Financial Performance in Periods of Growth and Contraction: Evidence from Australian Publicly Listed Companies.” *Journal of Cleaner Production* 102 (Supplement C): 324–32. doi:[10.1016/j.jclepro.2015.04.039](https://doi.org/10.1016/j.jclepro.2015.04.039).
- Orlitzky, Marc, and John D. Benjamin. 2001. “Corporate Social Performance and Firm Risk: A Meta-Analytic Review.” *Business & Society* 40 (4): 369–96.
- Orlitzky, Marc, Frank L. Schmidt, and Sara L. Rynes. 2003. “Corporate Social and Financial Performance: A Meta-Analysis.” *Organization Studies* 24 (3): 403–41.
- Peloza, John. 2009. “The Challenge of Measuring Financial Impacts from Investments in Corporate Social Performance.” *Journal of Management* 35 (6): 1518–41.
- Perfect, Steven B., and Kenneth W. Wiles. 1994. “Alternative Constructions of Tobin’s Q: An Empirical Comparison.” *Journal of Empirical Finance* 1 (3-4): 313–41.
- Porter, Michael E., and Mark R. Kramer. 2011. “The Big Idea: Creating Shared Value. How

to Reinvent Capitalism and Unleash a Wave of Innovation and Growth.” *Harvard Business Review* 89 (1-2).

———. 2018. “Creating Shared Value.” In *Managing Sustainable Business*, 327–50. Springer.

Porter, Michael E., and Claas van der Linde. 1995. “Toward a New Conception of the Environment-Competitiveness Relationship.” *Journal of Economic Perspectives* 9 (4): 97–118. doi:[10.1257/jep.9.4.97](https://doi.org/10.1257/jep.9.4.97).

Przychodzen, Justyna, and Wojciech Przychodzen. 2015. “Relationships Between Eco-Innovation and Financial Performance Evidence from Publicly Traded Companies in Poland and Hungary.” *Journal of Cleaner Production* 90 (March): 253–63. doi:[10.1016/j.jclepro.2014.11.034](https://doi.org/10.1016/j.jclepro.2014.11.034).

Roberts, Michael R., and Toni M. Whited. 2013. “Chapter 7 - Endogeneity in Empirical Corporate Finance.” In *Handbook of the Economics of Finance*, edited by George M. Constantinides, Milton Harris, and Rene M. Stulz, 2:493–572. Elsevier. doi:[10.1016/B978-0-44-453594-8.00007-0](https://doi.org/10.1016/B978-0-44-453594-8.00007-0).

Sánchez-Ballesta, Juan P., and Emma García-Meca. 2007. “A Meta-Analytic Vision of the Effect of Ownership Structure on Firm Performance.” *Corporate Governance: An International Review* 15 (5): 879–92.

Scarpellini, Sabina, Jesús Valero-Gil, and Pilar Portillo-Tarragona. 2016. “The ‘Economic-finance Interface’ for Eco-Innovation Projects.” *International Journal of Project Management* 34 (6): 1012–25. doi:[10.1016/j.ijproman.2016.04.005](https://doi.org/10.1016/j.ijproman.2016.04.005).

Schultze, Wolfgang, and Ramona Trommer. 2012. “The Concept of Environmental Performance and Its Measurement in Empirical Studies.” *Journal of Management Control* 22 (4): 375–412.

Semenova, Natalia, and Lars G. Hassel. 2016. “The Moderating Effects of Environmental Risk of the Industry on the Relationship Between Corporate Environmental and Financial Performance.” *Journal of Applied Accounting Research* 17 (1): 97–114. doi:[10.1108/JAAR-09-2013-0071](https://doi.org/10.1108/JAAR-09-2013-0071).

Song, Hang, Chunguang Zhao, and Junping Zeng. 2017. “Can Environmental Management Improve Financial Performance: An Empirical Study of A-Shares Listed Companies in China.” *Journal of Cleaner Production* 141 (Supplement C): 1051–6. doi:[10.1016/j.jclepro.2016.09.105](https://doi.org/10.1016/j.jclepro.2016.09.105).

Surroca, Jordi, Josep A. Tribó, and Sandra Waddock. 2010. “Corporate Responsibility and Financial Performance: The Role of Intangible Resources.” *Strategic Management Journal* 31

(5): 463–90.

Telle, Kjetil. 2006. “‘It Pays to Be Green’ a Premature Conclusion?” *Environmental and Resource Economics* 35 (3): 195–220.

Wang, Qian, Junsheng Dou, and Shenghua Jia. 2016. “A Meta-Analytic Review of Corporate Social Responsibility and Corporate Financial Performance: The Moderating Effect of Contextual Factors.” *Business & Society* 55 (8): 1083–1121. doi:[10.1177/0007650315584317](https://doi.org/10.1177/0007650315584317).

Wooldridge, J. M. 2008. “Chapter 15: Instrumental Variables and Two Stage Least Squares.” *Introductory Econometrics: A Modern Approach* 4: 506–45.

Wu, Meng-Ling. 2006. “Corporate Social Performance, Corporate Financial Performance, and Firm Size: A Meta-Analysis.” *Journal of American Academy of Business* 8 (1): 163–71.

Xie, Shuangyu, and Kohji Hayase. 2007. “Corporate Environmental Performance Evaluation: A Measurement Model and a New Concept.” *Business Strategy and the Environment* 16 (2): 148–68.

Zhang, Kai Quan, and Hsing Hung Chen. 2017. “Environmental Performance and Financing Decisions Impact on Sustainable Financial Development of Chinese Environmental Protection Enterprises.” *Sustainability* 9 (12): 2260.