Data

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 change [1] 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 1 describes my variables and following sections deeply explained each variables.

Dependent Variables

Regarding dependent variables, @EndrikatMakingsenseconflicting2014 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 [@Lioui2012, @Cavaco2014, @Muhammadrelationshipenvironmentalperformance2015, @Delmas2015, @Semenova2016, @ManriqueAnalyzingEffectCorporate2017]. 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 [@Chung1994]. 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 [@Lewellen1997]. 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 [@Perfect1994]. Tobin's Q value had been directly collected on Ycharts and this platform use the simple approximation of @Chung1994 which is summarized in Equation 1.

$$Tobin'sQ = \frac{MVE + PS + DEBT}{TA} \tag{1}$$

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.

[1] As a result of making a transition to a 100% rules-based approach, the methodology for the 2014 Newsweek Green Rankings differs considerably from the framework used in the 2012 Newsweek Green Rankings. Therefore ranking results prior to 2014 and ones subsequent can not be compared.

Table 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 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 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	Leverage	The ratio of long-term debt to common shareholders' equity (shareholders equity minus preferred equity) in absolute values
11	Net Margin	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 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. @Delmas2015 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.**

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

Table 2: Sample selection of the data base

	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

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 respectively calculated through equation 2, 3, 4 and 5.

$$EnP = \frac{Revenue}{TotalEnergyConsumption} \tag{2}$$

$$CaP = \frac{Revenue}{TotalGreenhousegasEmissions(Co2)} \tag{3}$$

$$WatP = \frac{Revenue}{TotalWater(m3)} \tag{4}$$

$$WastP = \frac{Revenue}{(Totalwastegenerated(metrictonnes) - wasterecycledandreused(metrictonnes)} \tag{5}$$

Control Variables

Several scholars [@Telle2006, @McWilliams2006, @Surroca2010] 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 [@Roberts2013], @EndrikatMakingsenseconflicting2014 have highlighted potential determinants of the relationship between CEP and CFP : firm size, industry sector, financial risk, R&D activities, advertising intensity and capital intensity.