

Data

Overview

The starting point of my data collection was the Newsweek Green Ranking. This ranking had assessed the world's largest publicly-traded companies in the US and in the world since 2009. It 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 attributes an overall green score to companies. This score is based on a weighted average of key performance indicators (KPI's). This study uses these KPI's to approach both process-based and outcome-based CEP of the 500 largest publicly-traded companies in the United States. 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, this study considers only 2014, 2015 and 2016 ranking. Among those three ranking and of the 500 US companies, 405 companies were listed for each year.

Even though green rankings were published in 2014, 2015 and 2016, each company is evaluated based on 2012, 2013 and 2014 data. Therefore, measures for financial performance of companies will be based on 2012, 2013 and 2014 fundamental data. Financial data have been collected on Morningstar, Stockpup and Ycharts using R code. The data collection process is described in the [Appendix A : Database construction]. Of the 405 initial companies, a total of 12 were dropped because of missing data. The final sample includes 393 publicly-traded companies in the US covering the period from 2012 till 2014 inclusively.

Table 1 gives an overview of variables of the econometric model. Following sections deeply explain each variable.

Dependent Variables

Regarding dependent variables, @EndrikatMakingsenseconflicting2014 claim that accounting-based measures (e.g. Return On Asset, Return On Equity, 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 which used both measures simultaneously, Return On Asset (i.e. Roa) and Tobin's Q are the most frequent [@Lioui2012, @Cavaco2014, @Muhammadrelationshipenvironmentalperformance2015, @Delmas2015, @Semenova2016, @ManriqueAnalyzingEffectCorporate2017]. Therefore this study uses 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. Due to a high right-skew of Tobin's Q (i.e. skew = 2.51) I use a natural logarithm transformation in order to normalize its distribution [@Honaker2011a].

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

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

Table 1: Variables Description

	Variables	Description
1	ROA	Earnings before interest over total firm assets
2	Tobins Q	The ratio of a firm's market value to the replacement cost of its assets
3	Carbon Productivity	Revenue (\$US) / Total Greenhouse gas Emissions (CO2)
4	Water Productivity	Revenue (\$US) / Total water (m3)
5	Waste Productivity	Revenue (\$US) / [Total waste generated (metric tonnes)–waste recycled/reused (tones)]
6	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. Dummy variable which equals 1 if such a link exists and 0 otherwise
7	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. Dummy variable which equals 1 if such a committee exists and 0 otherwise
8	Audit Score	Refers to the case where a company provides evidence that the latest reported environmental metrics were audited by a third party. Dummy variable which equals 1 if such evidences exist and 0 otherwise
9	Financial Leverage	The ratio of long-term debt to common shareholders' equity (shareholders equity minus preferred equity)
10	Growth	Net margin, namely the ratio of earnings to revenue
11	Firm Size	Natural logarithm of total assets
12	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

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.

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 proxies for process-based CEP and "Carbon Productivity", "Water Productivity" and "Waste Productivity" as a proxies for outcome-based CEP ¹.

A Sustainability Pay Link (i.e. SPL) 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 1 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 (i.e. STC) 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 1 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 Score (i.e. A) refers to the case where a company provides evidence that the latest reported environmental metrics were audited by a third party. A score of 1 if such an audit has been performed, and a score of 0 is given when such audit was not performed.

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

$$CaP_{it} = \frac{Revenue_{it}}{TGGE_{it}} \quad (2)$$

$$WatP_{it} = \frac{Revenue_{it}}{TW_{it}} \quad (3)$$

$$WastP_{it} = \frac{Revenue_{it}}{(TWG_{it} - TWRR_{it})} \quad (4)$$

where $Revenue_{it}$ is the total revenue in US\$, $TGGE_{it}$ is the total greenhouse gaz emissions in co_2 , TW_{it} is the total water in m_3 , TWG_{it} is the total waste generated in metric tons and $TWRR$ is the total waste recycled and reused in metric tons.

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, and capital structure. In a meta-analysis study, Ludecadedenexus2014 argued that growth rate is equally important. This study uses those four determinants as control variables.

The common way to approach *firm size* is to use the natural logarithm of total assets [Delmas2015, MiroshnychenkoGreenpracticesfinancial2017]. To approach the company *industry sector* I use the Global Industry Classification Standard (GICS) ². *Capital structure* is interpreted here as the financial leverage or more precisely as the debt to equity ratio, namely the ratio of long-term debt to common shareholders' equity

¹Newsweek Green Ranking have an other KPI that capture outcome-based CEP, namely Energy Productivity. Inserting this variable into my models create multicollinearity (Variance Inflation Factor superior to 5 for both Energy and Carbon Productivity). Consequently I do not consider this KPI in my models.

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.

(shareholders equity minus preferred equity). *Growth rate* is approached through the net margin (i.e. the ratio of earnings to revenue).