

1 Data Description

1.1 Overview

The starting point of the 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 has 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 company data. Therefore, measures for Corporate Financial Performance will be based on 2012, 2013 and 2014 fundamental data. Financial data have been collected on Morningstar, Stockpup and Ycharts using R technology. The data collection process is described in “[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 1.1 gives an overview of variables of the econometric model. Following sections deeply explain each variable.

1.2 Dependent Variables

Regarding dependent variables, ENDRIKAT ET AL. (2014) 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, ROA and Tobin's Q are the most frequent (CAVACO AND CRIFO, 2014; DELMAS ET AL., 2015; LIOUI AND SHARMA, 2012; MANRIQUE AND MARTÍ-BALLESTER, 2017; MUHAMMAD ET AL., 2015; SEMENOVA AND HASSEL, 2016). 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. ROA gives information about how a company can transform assets into profit.

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 prefer companies with Tobin's Q superior to one. Due to the complexity of calculating the replacement cost of a firm, the literature has seen several attempts to approximate Tobin's Q (PERFECT AND WILES, 1994). This study collected Tobin's Q data directly on Ycharts. The latter uses the simple approximation of CHUNG AND PRUITT (1994) which is summarized in equation 1. Due to a high right-skew (i.e. skewness = 2.51), I use a natural logarithm transformation to normalize the distribution of Tobin's Q (HONAKER ET AL., 2011).

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

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-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.

1.3 Independent Variables

Both process-based and outcome-based CEP has been approached with KPI's of the Newsweek Green Ranking. I use "Sustainability Pay Link", "Sustainability Themed Committee", and "Audit" as proxies for process-based CEP and "Carbon Productivity", "Water Productivity" and "Waste Productivity" as proxies for outcome-based CEP¹.

¹Newsweek Green Ranking has another KPI that captures outcome-based CEP (i.e. Energy Productivity). Due to multicollinearity concern (Variance Inflation Factor superior to 5 for both

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 otherwise.

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 otherwise.

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 accrues to the company if such an audit has been performed, and a score of 0 otherwise.

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 USD , $TGGE_{it}$ is the total greenhouse gas 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.

1.4 Control Variables

Scholars have argued that misspecified models may be another reason for the inconsistency of the empirical results in the CEP-CFP nexus (McWILLIAMS ET AL., 2006; SURROCA ET AL., 2010; TELLE, 2006). To improve the construct and to avoid the endogeneity issue due to omitted variables (ROBERTS AND WHITED, 2013), ENDRIKAT ET AL. (2014) have highlighted potential determinants of the relationship between CEP and CFP: firm size, industry sector, and capital structure. In a meta-analysis study, LU ET AL. (2014) argued that growth rate is equally important. This study uses those

Energy and Carbon Productivity), I do not consider it into my model.

four determinants as control variables.

The common way to approach *firm size* is to use the natural logarithm of total assets (DELMAS ET AL., 2015; MIROSHNYCHENKO ET AL., 2017). To approach the company *industry sector*, I use the Global Industry Classification Standard (GICS)². *Capital structure* is interpreted here as the financial leverage, namely as the debt to equity ratio. The latter is measured as the ratio of long-term debt to common shareholders' equity (shareholders equity minus preferred equity). The *growth rate* is approached through the net margin (i.e. the ratio of earnings to revenue).

Cavaco, S., Crifo, P., 2014. CSR and financial performance: Complementarity between environmental, social and business behaviours. *Applied Economics* 46, 3323–3338. doi:[10.1080/00036846.2014.927572](https://doi.org/10.1080/00036846.2014.927572)

Chung, K.H., Pruitt, S.W., 1994. A simple approximation of Tobin's q. *Financial management* 70–74. doi:[10.2307/3665623](https://doi.org/10.2307/3665623)

Delmas, M.A., Nairn-Birch, N., Lim, J., 2015. Dynamics of environmental and financial performance: The case of greenhouse gas emissions. *Organization & Environment* 28, 374–393. doi:[10.1177/1086026615620238](https://doi.org/10.1177/1086026615620238)

Endrikat, J., Guenther, E., Hoppe, H., 2014. Making sense of conflicting empirical findings: A meta-analytic review of the relationship between corporate environmental and financial performance. *European Management Journal* 32, 735–751. doi:[10.1016/j.emj.2013.12.004](https://doi.org/10.1016/j.emj.2013.12.004)

Hlavac, M., 2018. Stargazer: Well-formatted regression and summary statistics tables. R package version 5.2.1.

Honaker, J., King, G., Blackwell, M., 2011. Amelia II: A program for missing data. *Journal of statistical software* 45, 1–47. doi:[10.18637/jss.v045.i07](https://doi.org/10.18637/jss.v045.i07)

Lewellen, W.G., Badrinath, S.G., 1997. On the measurement of Tobin's q. *Journal of financial economics* 44, 77–122. doi:[10.1016/s0304-405x\(96\)00013-x](https://doi.org/10.1016/s0304-405x(96)00013-x)

Lioui, A., Sharma, Z., 2012. Environmental corporate social responsibility and financial performance: Disentangling direct and indirect effects. *Ecological Economics* 78, 100–111. doi:[10.1016/j.ecolecon.2012.04.004](https://doi.org/10.1016/j.ecolecon.2012.04.004)

Lu, W., Chau, K.W., Wang, H., Pan, W., 2014. A decade's debate on the nexus between corporate social and corporate financial performance: A critical review of empirical studies 20022011. *Journal of Cleaner Production* 79, 195–206.

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.

doi:[10.1016/j.jclepro.2014.04.072](https://doi.org/10.1016/j.jclepro.2014.04.072)

Manrique, S., Martí-Ballester, C.-P., 2017. Analyzing the Effect of Corporate Environmental Performance on Corporate Financial Performance in Developed and Developing Countries. *Sustainability* 9, 1957. doi:[10.3390/su9111957](https://doi.org/10.3390/su9111957)

McWilliams, A., Siegel, D.S., Wright, P.M., 2006. Corporate social responsibility: Strategic implications. *Journal of management studies* 43, 1–18. doi:[10.1111/j.1467-6486.2006.00580.x](https://doi.org/10.1111/j.1467-6486.2006.00580.x)

Miroshnychenko, I., Barontini, R., Testa, F., 2017. Green practices and financial performance: A global outlook. *Journal of Cleaner Production* 147, 340–351. doi:[10.1016/j.jclepro.2017.01.058](https://doi.org/10.1016/j.jclepro.2017.01.058)

Muhammad, N., Scrimgeour, F., Reddy, K., Abidin, S., 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, 324–332. doi:[10.1016/j.jclepro.2015.04.039](https://doi.org/10.1016/j.jclepro.2015.04.039)

Perfect, S.B., Wiles, K.W., 1994. Alternative constructions of Tobin's q: An empirical comparison. *Journal of empirical finance* 1, 313–341. doi:[10.1016/0927-5398\(94\)90007-8](https://doi.org/10.1016/0927-5398(94)90007-8)

Roberts, M.R., Whited, T.M., 2013. Chapter 7 - Endogeneity in Empirical Corporate Finance, in: Constantinides, G.M., Harris, M., Stulz, R.M. (Eds.), *Handbook of the Economics of Finance*. Elsevier, pp. 493–572. doi:[10.1016/B978-0-44-453594-8.00007-0](https://doi.org/10.1016/B978-0-44-453594-8.00007-0)

Semenova, N., Hassel, L.G., 2016. The moderating effects of environmental risk of the industry on the relationship between corporate environmental and financial performance. *J Applied Accounting Research* 17, 97–114. doi:[10.1108/JAAR-09-2013-0071](https://doi.org/10.1108/JAAR-09-2013-0071)

Surroca, J., Tribó, J.A., Waddock, S., 2010. Corporate responsibility and financial performance: The role of intangible resources. *Strategic management journal* 31, 463–490. doi:[10.1002/smj.820](https://doi.org/10.1002/smj.820)

Telle, K., 2006. “It pays to be green” a premature conclusion? *Environmental and Resource Economics* 35, 195–220. doi:[10.1007/s10640-006-9013-3](https://doi.org/10.1007/s10640-006-9013-3)

Table 1.1: Variables Description

	Variables	Description
1	ROA	Earnings before interest over total firm assets
2	Tobin's Q	The ratio of a firm's market value to the replacement cost of its assets
3	CaP	Revenue (USD) / Total Greenhouse gas Emissions (CO2)
4	WaP	Revenue (USD) / Total water (m3)
5	WastP	Revenue (USD) / [Total waste generated (metric tonnes)–waste recycled/reused (tones)]
6	SPL	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	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. Dummy variable which equals 1 if such a committee exists and 0 otherwise
8	A	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 evidence exist and 0 otherwise
9	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 takes 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