Towards Green Companies: A Panel Data Study of The Environmental and Financial Performance Nexus

Pierrick KINIF

Supervised by Sophie BÉREAU and Jean-Yves GNABO

University of Namur

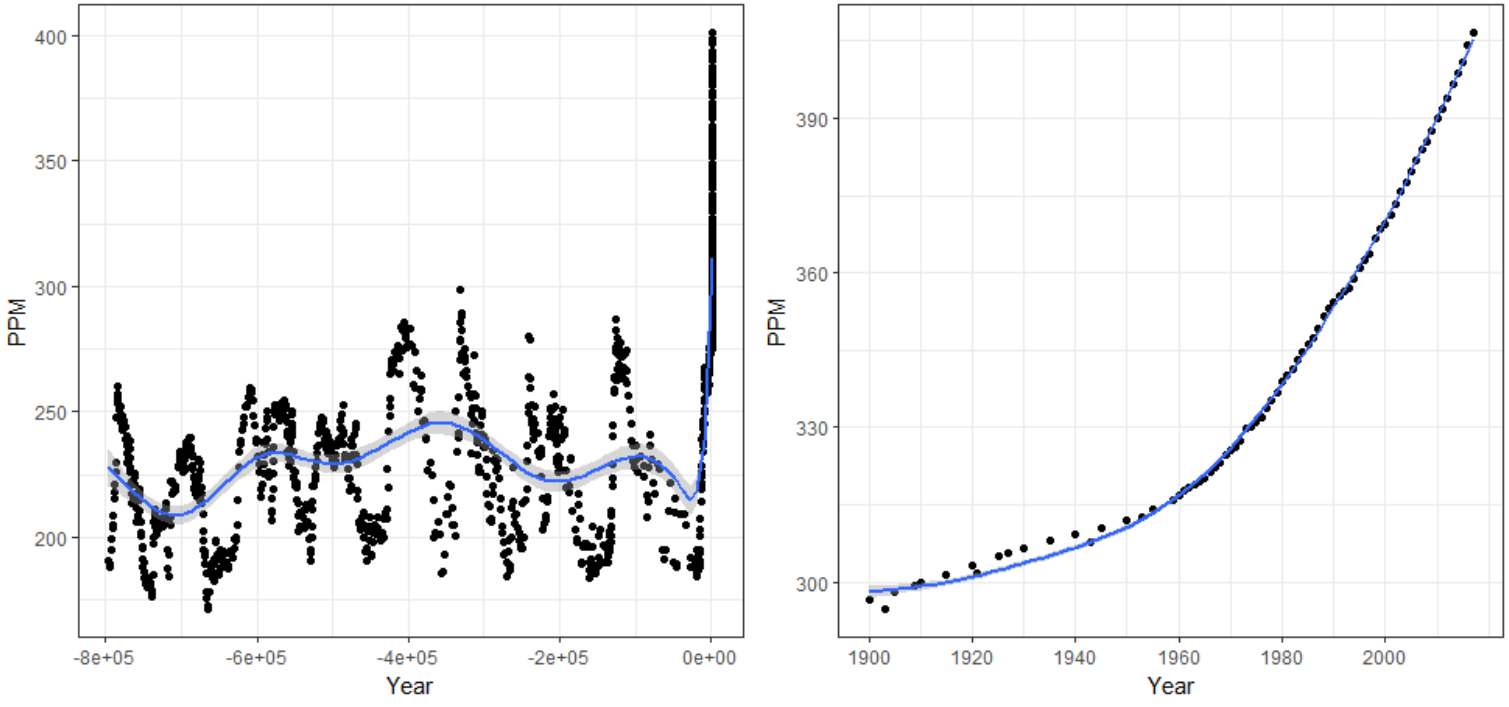
Faculty of Economics, Social Sciences and Business Administration

June 20, 2018

Introduction

Global Warming Is Not a Myth and Is Growing Fast

Figure 1: Global Atmospheric Concentrations of Carbon Dioxide Over Time



Source: Data coming from US EPA (2016) and Pieter Tans et al. (2018)

Global Warming Represents a Threat for Companies

- Resource depletion, effect on geography, increase of incertainty, increase of natural disasters,...
- "The ice sheets of Antarctica hold enough water to raise global sea level by 58 meters" (Fretwell et al., 2013)
- The Business and Sustainable Development Commission (2017) (p12) report states:

  "... businesses need to pursue social and environmental sustainability as avidly as they pursue market share and shareholder value... If they don't, the costs and uncertainty of unsustainable development could swell until there is no viable world in which to do business."

Turn the Threat into an Opportunity

- Companies are important stakeholders of Global Warming.
- They are part of the **problem** but can be part of the **solution**
- The solution is **profitable**

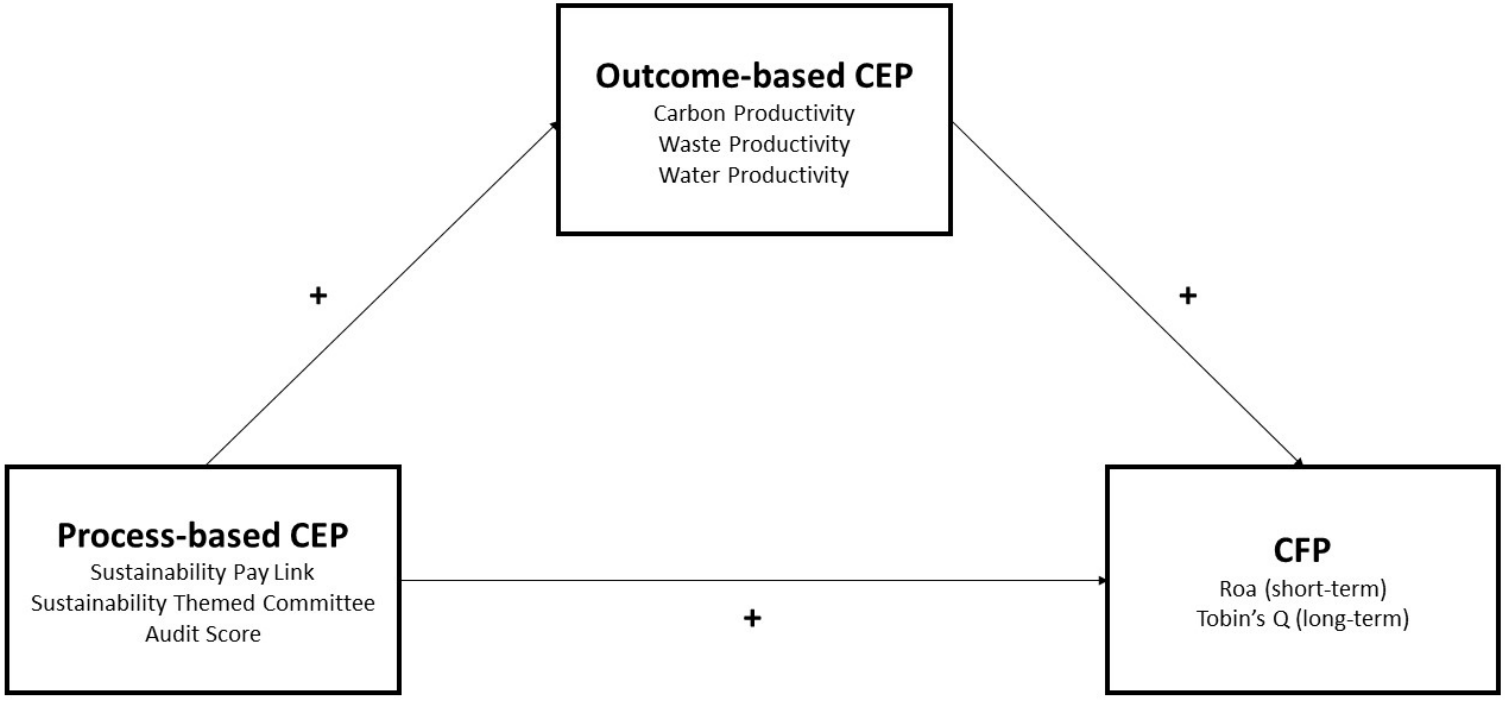
Contribution of this thesis

This thesis **provides incentives** for companies to invest in environmental strategies and shows that **it does pay to be green**. Companies with better corporate environmental performance have better financal performance and the relation increases with a long-term perspective.

Theoretical Framework

Corporate Environmental And Financial Performance Nexus

Figure 2: Research Framework



Methodology

Econometric Model

The link between Process-Based CEP and Outcome-Based CEP

$$Y_{it} = \alpha + \beta_1 SPL_{it} + \beta_2 STC_{it} + \beta_3 AS_{it} + Controls_{it} + d_t + u_{it} \quad (1)$$

where Y_{it} is a proxy of outcome-based CEP measured as carbon productivity, water productivity and waste productivity, SPL_{it} is a proxy for a firm's sustainability pay link, STC_{it} is a proxy for a firm's sustainability themed commitment, AS_{it} is a proxy for a firm's audit score, $Controls_{it}$ is a vector of control variables that includes firm size, industry sector, financial leverage and growth, d_t represents the time effect and u_{it} is the error term.

The link between CEP and CFP

$$\begin{aligned} Y_{it+1} = \quad & \alpha + \beta_1 SPL_{it} + \beta_2 STC_{it} + \beta_3 AS_{it} + \beta_4 CaP_{it} \\ & + \beta_5 WatP_{it} + \beta_6 WastP_{it} + Controls_{it} + d_t + u_{it} \end{aligned} \quad (2)$$

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, AS_{it} is a proxy for a firm's audit score, 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 includes firm size, industry sector, financial leverage and growth, d_t represents the time effect and u_{it} is the error term.

Panel Data

General form:

$$Y_{it} = \alpha + \beta_k X_{itk} + u_{it} \tag{3}$$

- with $u_{it} = \mu_i + \epsilon_{it}$
- μ_i is the individual error component and is time-invariant. It can be considered as the unobserved effect model
- ϵ_{it}, is the idiosyncratic error which is assumed well-behaved and independent of X_{it} and μ_i

If $\rho(X_{itk}, \mu_i) \neq 0$ then μ_i is considered as the *Fixed Effect* (i.e. FE) and equation 3 becomes:

$$Y_{it} = (\alpha + \mu i) + \beta_k X_{itk} + \epsilon_{it} \tag{4}$$

else, μ_i is considered as the *Fixed Effect* (i.e. FE) and equation 3 becomes:

$$Y_{it} = \alpha + \beta_k X_{itk} + (\epsilon_{it} + \mu i) \tag{5}$$

- FE and RE models imply that OLS estimators of β_k are inconsistent

Panel Data

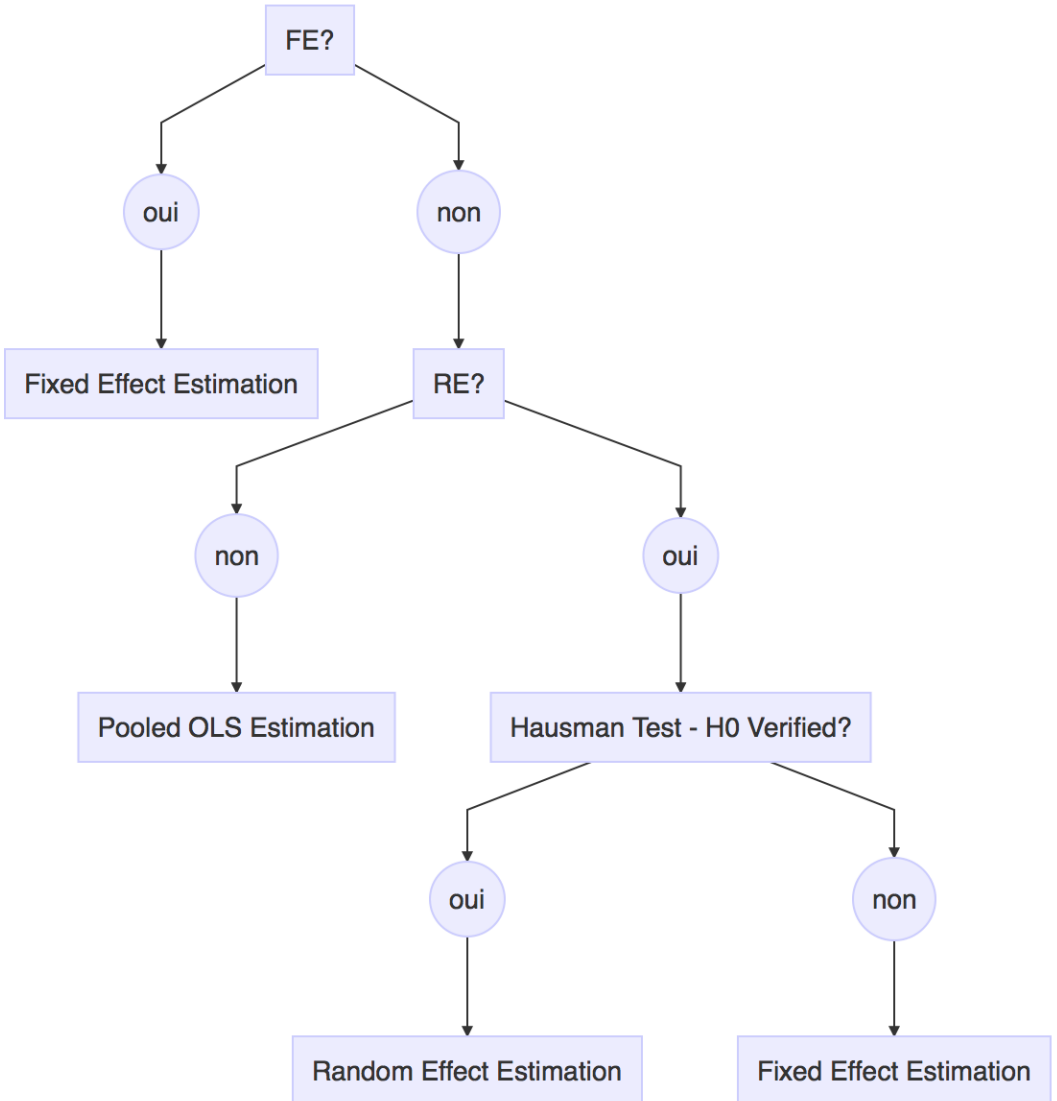


Figure 3: Process to Determine the Estimation Method

Results

Process-Based CEP Positively Influences Outcome-Based CEP

Table 1: The Impact of Process-Based on Outcome-Based CEP

	Dependent variable:		
	CaP Model (1)	WaP Model (2)	WastP Model (3)
SPL	0.010 (0.011)	0.022* (0.012)	0.025** (0.011)
STC	0.058*** (0.010)	0.067*** (0.011)	0.046*** (0.011)
AS	0.057*** (0.010)	0.068*** (0.011)	0.071*** (0.011)
FirmSize	−0.005 (0.008)	−0.008 (0.008)	−0.010 (0.008)
Leverage	0.0003 (0.001)	0.001* (0.001)	0.001** (0.001)
Growth	0.028 (0.028)	0.001 (0.030)	0.003 (0.028)
Industry	0.002 (0.002)	−0.00001 (0.002)	0.004** (0.002)
BPLM test (pvalue)	0***	0***	0***
F test (pvalue)	0***	0***	0***
Observations	1,123	1,123	1,123
Adjusted R^2	0.109	0.138	0.132
F Statistic (df = 7; 1113)	20.888***	26.892***	25.632***
Note:			*p<0.1; **p<0.05; ***p<0.01

Both Process and Outcome-Based CEP Have a Positive Impact on CFP

Table 2: The Impact of Process and Outcome-Based CEP on CFP

	Dependent variable:	
	TobinsQ	ROA
	Model (4)	Model (5)
SPL	0.079* (0.044)	0.008** (0.004)
STC	0.063 (0.044)	0.012*** (0.004)
AS	0.158*** (0.044)	−0.004 (0.004)
CaP	−0.012 (0.135)	0.030** (0.012)
WaP	0.337** (0.155)	0.006 (0.012)
WastP	−0.199 (0.156)	0.010 (0.012)
FirmSize	−0.443*** (0.015)	−0.020*** (0.001)
Leverage	0.003 (0.003)	−0.00000 (0.0003)
Growth	0.465*** (0.152)	0.138*** (0.012)
Industry	−0.026*** (0.007)	−0.002*** (0.001)
Constant	10.701*** (0.345)	
BPLM test (pvalue)	0.508	0.024**
F test (pvalue)	0.323	0.012**
Observations	954	1,093
Adjusted R^2	0.500	0.282
F Statistic	96.388*** (df = 10; 943)	44.007*** (df = 10; 1080)
Note:		*p<0.1; **p<0.05; ***p<0.01

Summary

Main Findings and Contributions

1. Process-based CEP positively influences outcome-based CEP
2. Both process and outcome-based CEP have a positive impact on CFP
3. This relationship is always positive, no matter the time horizon, and is stronger with a long-term perspective than a short-term perspective
4. It pays to be green

Thank you,

References

Business and Sustainable Development Commission, 2017. Better business, better world - The report of the Business & Sustainable Development Commission.

Fretwell, P., Pritchard, H.D., Vaughan, D.G., Xiangbin, C., Zirizzotti, A., 2013. Bedmap2: Improved ice bed, surface and thickness datasets for Antarctica. The Cryosphere 7, 375–393. doi:10.5194/tc-7-375-2013

Gistemp Team, 2018. GISS Surface Temperature Analysis (GISTEMP). NASA Goddard Institute for Space Studies. [WWW Document]. URL https://data.giss.nasa.gov/gistemp/. (accessed 4.15.18).

Imbie Team, 2018. Mass balance of the Antarctic Ice Sheet from 1992 to 2017. Nature 558, 219. doi:10.1038/s41586-018-0179-y

Pieter Tans, NOAA/ESRL, Ralph Keeling, 2018. ESRL Global Monitoring Division - Global Greenhouse Gas Reference Network - Mauna Loa CO2 records [WWW Document]. URL https://www.esrl.noaa.gov/gmd/ccgg/trends/data.html (accessed 5.15.18).

US EPA, O., 2016. Climate Change Indicators: Atmospheric Concentrations of Greenhouse Gases [WWW Document]. US EPA. URL https://www.epa.gov/climate-indicators/climate-change-indicators-atmospheric-concentrations-greenhouse-gases (accessed 6.18.18).