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

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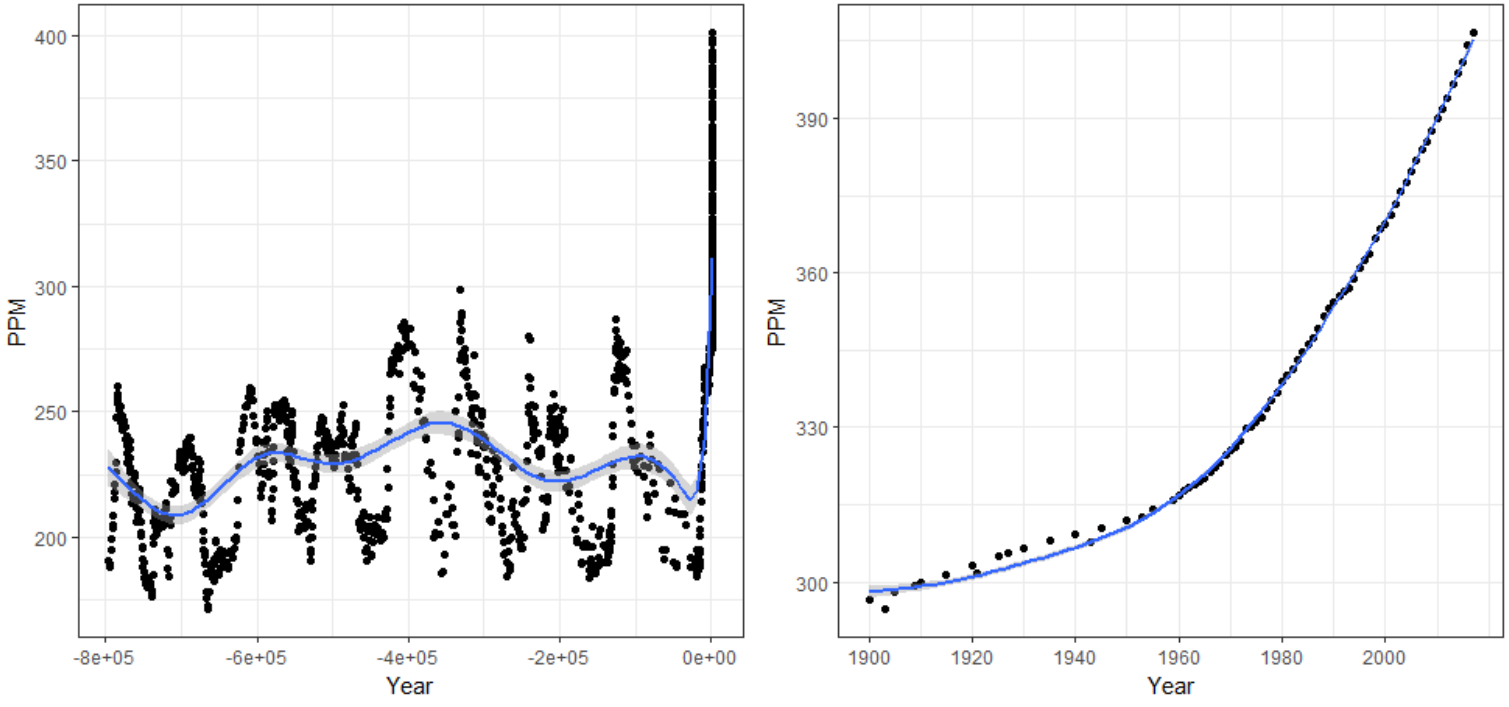
Introduction

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

- **1880 - 2017:** +1°(C) of the world's temperature (GISTEMP TEAM, 2018)
- **1900-2011:** Sea Level Rise of 0.19m (IMBIE TEAM, 2018)
- **2011-2100** Sea Level Rise expected between +0.20m (95%) and +1m (5%) (PICKERING ET AL., 2017)
- "The ice sheets of Antarctica hold enough water to raise global sea level by 58 meters" (FRETWELL ET AL., 2013)
- *"... the costs and uncertainty of unsustainable development could swell until there is no viable world in which to do business."* (BUSINESS AND SUSTAINABLE DEVELOPMENT COMMISSION, 2017, p12)

Turn the Threat into an Opportunity

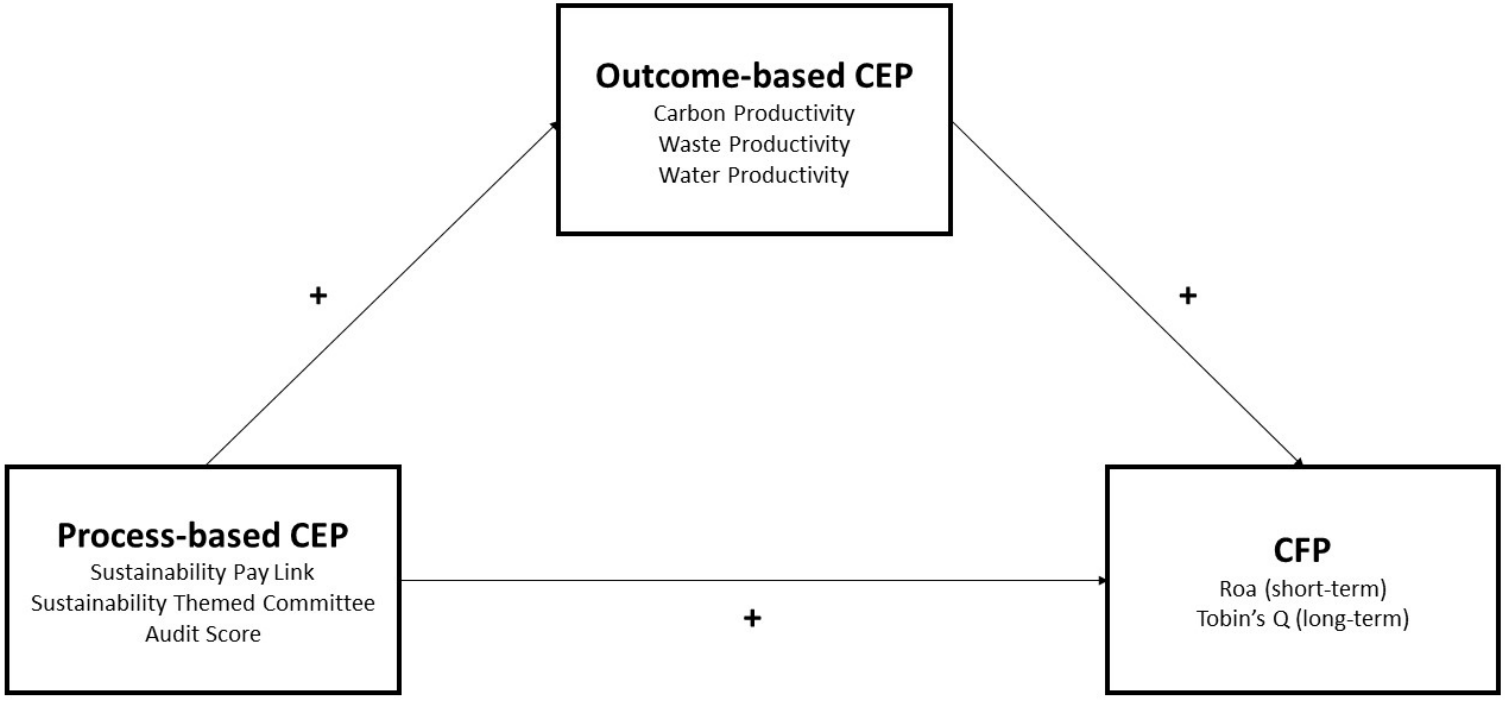
- Companies are important stakeholders of Global Warming.
- They are part of the **problem** but can be part of the **solution**
- The solution is **profitable**

Does it pay to be green?

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 *Random Effect* (i.e. RE) 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

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

It pays to be green !

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

Thank you

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