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How does Corporate Environmental Performance Impact the Stock Performance of Finnish Firms? Implications for Sustainability

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Abstract

This study examines the relationship between corporate environmental performance (CEP) and corporate financial performance (CFP) in Finland. Based on the data from 21 large Finnish companies listed on the Nasdaq Helsinki, a linear regression model is developed for inquiring into the connection between CEP and CFP. After controlling for the effect of four variables namely, profitability (ROA), leverage (debt-to-equity ratio), research and development intensity (research and development expenses divided by total sales) and growth (percentage change in sales), the current study finds that better CEP contributes to better CFP even in a civil law country like Finland and even if the quantitative measure so CEP are employed in the analysis. GHG emissions emerge as the most important proxy of CEP, having a significant influence on the stock market returns, no matter the way GHG emissions is used in the generic regression model (i.e., amount of GHG emissions, reduction in GHG emissions, or ratio of GHG emissions to sales revenues), whereas water consumption, in all cases, has no significant impact on stock returns. Waste production and energy consumption also emerge as factors having significant influence on the stock market returns if certain measures of CEP are employed (e.g., absolute amount of and reduction in the amount of waste production, and reduction in the amount of energy consumption). Our analysis has important implications for policymakers and investors.

Keywords: Corporate environmental performance; Finnish firms; Stock returns; GHG emissions.

1. Introduction

This study examines the impact of corporate environmental performance (CEP) on stock market returns, a stock market-based measure of corporate financial performance (CFP). A vast literature has developed over the past four decades investigating the relationship between CEP and CFP, but such investigations did not produce any conclusive results (Wang *et al*., 2014). Some authors (e.g., Al-Tuwaijri *et al*., 2004; Capece *et al*., 2017; Fujii *et al*., 2013; Hart & Ahuja, 1996; King & Lenox, 2001; Konar & Cohen, 2001; Nakao *et al*., 2007; Russo & Fouts, 1997; Zhu et al., 2016) find that the CEP positively contributes to the CFP; others (e.g., Sarkis & Cordeiro, 2001; Stanwick & Stanwick, 1998; Wang *et al*., 2014) find the opposite; another group of researchers (e.g., Elsayed & Paton, 2005; Jaggi & Freedman, 1992; Lee, 2012; Telle, 2006) fails to draw a clear conclusion about the CEP-CFP linkage. Research identifies three groups of theoreticians providing explanations for the inconclusive outcomes of the CEP-CFP nexus. The first group of theoreticians, who are identified by Horváthová (2010, p. 52) as 'traditionalist', argues that CEP entails additional costs for firms and thereby decreases marginal net benefits; the second group, whom Horváthová (2010, p. 52) considers 'revisionist', challenges the view of the traditionalists by contending that CEP can lead to increased social welfare and private benefits of firms. The third group of theoreticians explains the neutral relationship between CEP and CFP by asserting that firms not engaging in social responsibility (environmental initiatives are part of social responsibility (Sahay, 2004)) will incur lower costs and have lower prices and firms engaging in the same will incur higher costs but will receive higher prices from customers (McWilliams & Siegel, 2001).

Varying explanations for the controversial relationship between CEP and CFP are found in the existing literature. For example, use of a small sample size (Konar and Cohen, 2001), lack of objective environmental criteria to evaluate CEP (Konar and Cohen, 2001), absence of clear definitions of CEP and CFP (Griffin and Mahon, 1997), differences in methodologies as well as the choice of CEP and CFP variables (Derwall *et al*., 2005; Ullman, 1985) are some of the probable reasons (as identified by researchers) for the inconclusive results on the CEP-CFP nexus. Horváthová (2010), in order to assess the heterogeneity in the connection between CEP and CFP, conducts a meta-regression analysis of 64 outcomes that are obtained from 37 empirical investigations. The study reveals that the direction of the association between CEP and CFP

depends on the type of measures of CEP used in previous studies; for example, if qualitative measures of CEP (e.g., ratings, adoption of environmental management systems, adoption of environmental policy) are used, it is a more likely that CEP will have a positive contribution to CFP. Horváthová (2010) suggests further that the type of measures of CFP[1] employed in earlier studies has no impact on the association between CEP and CFP.

Reviews of prior research on the CEP-CFP nexus confirm the use of a variety of measures to assess CEP and CFP[2]. Although both accounting and stock market based measures of CFP have been used in prior studies, the use of stock market returns as a measure of CFP is rather limited (Stekelenburg *et al*., 2015)[2]. This paper extends the above strands of lterature by examining the impact of CEP on the stock market returns of Finnish companies listed on the Nasdaq Helsinki. It employs a quasi-exhaustive list of quantitative measures of CEP (the detailed description of which is provided in the *Data and Methodology* section).

A debate exists on the use of accounting and market measures of CFP (Gentry & Shen, 2010, Hassan & Romilly, 2018). Accounting measures reflect only the past financial performance of a firm during the previous quarters or years, whereas market measures reflect more the current and to some extent future prospects of the firm performance as discounted on the stock market. There are arguments for and against both the measures. Opponents of stock market-based measures of CFP (e.g., Bettis, 1983; Bromiley, 1990; Tobin, 1984) caution against the use of these measures as they "assume market efficiency where full market efficiency is at best an unrealistic case" (Hassan & Romilly, 2018, p. 6). Proponents of the same (e.g., Chakravarthy, 1986; Lubatkin & Shrieves, 1986) argue that accounting-based measures are susceptible to managerial manipulation and fraud, whereas stock market-based measures are less prone to such manipulation and thus incorporate all relevant information; in addition, according to Johnson *et al*. (1985), maximization the wealth of shareholders is the ultimate economic objective of the firm. Considering the facts that neither of these measures is perfect and without limitations (Hoskisson *et al*., 1999), some argues that the type of measures of CFP employed in earlier studies has no impact on the

[1] Researchers use two types of measures for assessing corporate financial performance: accounting and market measures (Gentry & Shen, 2010; Hassan & Romilly, 2018). Accounting measures include return on assets (ROA), return on equity (ROE) and return on sales (ROS), whereas market measures encompass Tobin's Q, firm value and market returns.
[2] Table 1 summarizes notable studies on the CEP-CFP nexus.

association between CEP and CFP (see, Horváthová, 2010) ; this study employs stock returns as a proxy for firm financial performance.

Regarding our research context, Finnish listed companies draw research attention for two reasons: first, Finland faces a number of serious environmental threats; for example, Finland is already affected by climate change[3]. For example, the average temperature has been rising over the last hundred and fifty years[4]. The biodiversity of Finland is also threatened given that around 10% of Finnish species were endangered in 2010[4]. Second and finally, Finland is a civil law country; earlier research indicates that positive links between CEP and CFP (i.e., better environmental performance leads to better financial performance) are observed more often in countries that follow common law than those practicing civil law (Horváthová, 2010). Finnish companies, operating in a civil law country, have not received adequate research attention as far as CEP-CFP connection is concerned.

In inquiring into the relationship between CEP and CFP, this study takes a *Revisionist* view (as discussed earlier) and postulates that CEP positively contributes to CFP. More specifically, the following hypotheses are tested:

***Hypothesis 1*:** Firms with lower amount of GHG emissions, waste production, and energy and water consumption tend to experience higher stock returns in the subsequent year.

***Hypothesis 2*:** Firms that experience a reduction in the GHG emissions, waste production and energy and water consumption tend to have higher stock returns in the subsequent year.

***Hypothesis 3*:** Firms with lower ratios of GHG emissions, waste production and energy and water consumption to total sales revenues tend to experience higher stock returns in the subsequent year.

Collectively, the findings provide support for the hypotheses postulated above and indicate that stocks of the companies that have better environmental performance yield higher stock returns than those of the poor environmentally performing companies.

Overall, this research offers three major contributions: (i) it delivers new evidence on the connection between CEP and CFP; (ii) it provides methodological advancements as far as

[3] http://www.ymparistotiedonfoorumi.fi/puheenvuorot/ilmastonmuutos-haastaa-perinteisen-luonnonsuojelun/.
[4] https://ec.europa.eu/clima/change/causes_en.

measures of CEP are concerned; (iii) being conducted in Finland, a civil law country, the study provides a contextual contribution, enriching studies focusing only on common law countries.

The rest of the chapter is structured in four sections. Section 2 outlines the methods. Section 3 presents the results. Section 4 discusses the results. Section 5 provides some implications and limitations of the study, and opens the door for future research.

2. Data and Methodology

2.1. Sample

For the purpose of testing the hypotheses, a sample of 168 observations is collected over a 8-year period (from 2013 to 2020 for the independent and control variables and from 2014 to 2021 for the dependent variable) for 21 large Finnish companies listed on the Nasdaq Helsinki that disclosed environmental information in their annual reports or sustainability reports. Information on CEP and CFP is extracted from the sampled companies' sustainability and annual reports respectively. In addition, stock market data are retrieved from DataStream.

2.2. Variables

2.2.1. Dependent variable

This study considers annual stock market returns as the dependent variable measuring stock financial performance.

2.2.2. Independent variables

In contrast to studies that have used qualitative measures of CEP, this study employs quantitative measures. Three types of quantitative measures are used to assess CEP: i) amount of greenhouse gas (GHG) emissions, waste production, energy and water consumption; ii) reduction in the amount of GHG emissions, waste production, and energy and water consumption; and iii) ratios of GHG emissions, waste production, energy and water consumption to total revenue. Amount of GHG emissions are used in several studies as a measure of CEP (e.g., Apergis *et al*., 2013; Braam *et al*., 2016; Freedman & Jaggi, 2011; Hassan & Romilly, 2017; Kim & Lyon, 2011; Luo & Tang,

2014); amount of waste production and water consumption are previously used (Braam *et al*., 2016; Cordeiro & Sarkis, 1997) and this study proposes 'amount of energy consumption' as a new measure of CEP. The total amounts of GHG emitted, waste produced, and energy and water consumed each year are extracted from the sustainability report (of the corresponding year) of each company and then the logarithms of those amounts are calculated for the sake of normality. Hart & Ahuja (1996) employ 'emissions reduction' as a measure of CEP; the current study introduces reduction in the amount of GHG emissions, waste production, and energy and water consumption as new measures of CEP; reduction for each company is measured as percentage change in the total amount of GHG emissions, waste production, and energy and water consumption. Braam *et al*. (2016) use ratios of GHG emissions, waste production and water consumption to total revenue as measures of CEP; Molloy et al. (2002) employ the ratio of reported toxic chemical emissions to total revenue as a measure of CEP; the present research adds to this list the ratio of energy consumption to total revenue as a new measure.

2.2.3. Control variables

Following the existing literature, we control for profitability, leverage, research-and-development (R&D) intensity and growth. In fact, return on assets (ROA) is used as a measure of profitability and it is calculated by dividing fiscal year-end net income by year-end total assets. The regression model includes ROA due to the fact that firms with better profitability have higher liberty to launch relatively comprehensive ecological accountability curricula (Braam, 2016). Leverage is calculated as the debt to equity ratio. R&D intensity is computed as the ratio of R&D expenses to total sales revenues. Growth is calculated as a year-to-year percentage change in sales. Though firm size is found as a control variable in the existing literature, it is ignored in this paper as the sample includes only the large listed Finnish companies. As for the definitions and measurements of the variables, they are presented in Table 2.

2.3 Regression model

The following regression model is estimated[5]:

[5] Since the Hausman test suggests that random effect models are inappropriate, estimation of fixed effect models is considered at the time of analyzing the data.

$$R_{j,t} = \beta_0 + \beta_1 CEP_{j,t-1} + \beta_2 Prof_{j,t-1} + \beta_3 Lev_{j,t-1} + \beta_4 R\&DI_{j,t-1} + \beta_5 Grwt_{j,t-1} + \varepsilon_t \quad (1)$$

where, $R_{j,t}$ is the dependent variable and indicates annual stock return for firm *j* in year *t*, $CEP_{j,t-1}$ indicates corporate environmental performance of firm *j* in year *t-1*; it is the only independent variable that explains the variability in the annual stock returns. The lagged value of CEP is used because it takes time for CEP to have an impact on CFP (Hart & Ahuja, 1996). $Prof_{j,t-1}$, $Lev_{j,t-1}$, $R\&DI_{j,t-1}$ and $Grwt_{j,t-1}$ are the control variables that stand for profitability, leverage, R&D intensity and growth of firm *j* in year *t-1* respectively. All parameters of the model are estimated with robust standard errors. In order to check the robustness of the main results, the generic regression model is estimated using various measures of CEP.

The Pearson correlations coefficients, which are presented in Table 3, exhibit a high degree of correlations among the different indicators of CEP. The existence of such high correlations could be attributed to the fact that these indicators are constructed using the same measures. Consequently, four different models are used to estimate the effects of each indicator of CEP. We call these models, Model 1, Model 2, Model 3 and Model 4, as shown in Tables 5-7.

3. Results and Discussion

Table 4 shows the descriptive statistics for all variables[6]. Tables 5-7 present the results of the regression analysis that scrutinizes the linkage among different measures of CEP and stock market returns. Table 5 measuring the proxies in absolute terms reveals significantly negative estimates for Models 1 and 4, but insignificant estimates for Models 2 and 3. These results indicate that firms with higher amounts of GHG emissions and waste production are more likely to experience lower stock returns in the subsequent year than firms with lower emissions and waste production, other factors being fixed. On the other hand, the amounts of energy and water consumption by companies have no impact on their stock returns.

Table 6, where reductions in constructs are employed as measures of CEP, demonstrates significantly positive estimates for Models 1, 2 and 4; Table 6 exhibits insignificant results for Model 3. These results suggest that companies that have been successful in reducing GHG

[6] Descriptive statistics for CEP measured in absolute amount of GHG emissions, waste production, and energy and water consumption have been shown in Table 2. Descriptive statistics using other two types of measures are available with the author.

emissions, energy consumption and waste production have higher stock market returns in the subsequent year than companies that have failed to do the same, everything else being equal. However, the effect of water consumption on stock market returns still remains insignificant even if reduction in water consumption is employed as a measure of CEP.

Table 7 reveals significantly negative results only for Model 1, while the estimates obtained from other models appear to be insignificant, stipulating that stocks having a higher ratio of discharges to sales revenues experience lower returns, everything else being equal.

Overall, the results indicate that GHG emissions emerge as the most important proxy of CEP, having a significant influence on the stock market returns, no matter the way GHG emissions is used in the generic regression model (i.e., amount of GHG emissions, reduction in GHG emissions, or the ratio of GHG emissions to sales revenues), whereas water consumption, in all cases, has no significant impact on the stock market returns. Waste production and energy consumption have significant impact on stock market returns if certain measures of CEP are employed (e.g., absolute amount of and reduction in the amount of waste production and reduction in the amount of energy consumption). Our results reveal that the analysis is robust to the various proxies of CEP as far as GHG emissions are concerned. Collectively, the results provide support for the formulated hypotheses, indicating that the stocks of better environmentally performing companies yield higher returns than those of poorer environmental performers. The results of this research are consistent with the studies of Al-Tuwaijri et al. (2004), Boiral (2005), Capece *et al*. (2017), Cordeiro & Sarkis (1997), Hart & Ahuja (1996) and Nishitani & Kokubu (2012), but at the same time, they oppose the findings obtained from the investigations of Horváthová (2010), Wang *et al*. (2014).

This chapter contributes to the current body of knowledge in a number of ways. First, this investigation, using annual stock market returns as a measure of CFP and different quantitative measures of CEP, furnishes new evidence on the CEP-CFP nexus opposing the evidence found in the studies of Horváthová (2010) and Wang *et al*. (2014). Second, this inquiry provides methodological advancements by introducing new quantitative measures of CEP such as amount of energy consumption, reduction in the amount of energy consumption and energy intensity (energy consumption to total sales). Third and finally, this study, being the first one in the context of Finland, has a contextual contribution; the findings of this research imply that investors in Finland are concerned about climate change and environmental degradation. Climate change is

aggravated by global warming (Jones, 2010) and the impact of rising greenhouse gas (GHG) emissions on global warming is well recognized (Giannarakis *et al*., 2017; Liao *et al*., 2015). In this regard, corporations are in large part responsible for environmental degradation (Liao *et al*., 2015) and consequently they should play a crucial role in alleviating climate change (Hossain *et al*., 2017). The findings of this investigation suggest that stock prices of the Finnish companies listed on the Nasdaq Helsinki reflect Finnish investors' concern over the subject of climate change as environmentally conscious investors of Finland tend to place their investment in environmentally friendly companies. Moreover, prior studies (e.g., Horváthová, 2010) claim a negative contribution of CEP toward CFP in civil law countries, whereas this inquiry refutes such claim by indicating that environmental performance of the companies in Finland, a civil law country, contributes positively toward financial performance.

4. Discussion

Our findings have key implications for investors, corporate top management, and policy makers. Investors could consider the results of this study when making investment decisions in companies that are concerned about the environment; thus, they could play an important role in preserving the environment as well as avoid incurring a financial penalty by investing in environmentally friendly companies. Corporate top management could use the findings of this empirical study to gain trust of investors and environmental stakeholders by making proper asset allocation to environmental agendas. The findings of this study also imply that policy makers should formulate appropriate environmental policies for companies to enhance their environmental performance that would lead to an enhancement of their financial performance, which encourages environmental responsible investments and initiatives. For example, policies could be formulated to encourage environmentally sensitive companies to increase the use of clean energies or greener production and distribution facilities, which would reduce the adverse impacts of fossil fuel consumption by companies on the environment and consequently would make those companies attractive to environmentally conscious investors. In this regard, proper environmental policies not only improve corporate environmental performance but also play an important role in enhancing the sustainability of the economy. Hence, this strand of research has implications for regulators and policymakers looking for long-term sustainability (Hunjra et al., 2022; Zaied et al., 2023). In

particular, our analysis is beneficial for developing green investment policies which are immensely important for achieving the net-zero goals (Hunjra et al., 2022).

5. Conclusions

This study focuses on the link between CEP and CFP in Finland. Based on 8-year period 2013-2020 covering data from 21 large Finnish companies listed on the Nasdaq Helsinki, a linear regression model is developed for inquiring into the connection between CEP and CFP. After controlling for the effect of four variables namely, profitability (ROA), leverage (debt-to-equity ratio), research and development intensity and growth (percentage change in sales), the current study finds that better CEP contributes to better CFP even in a civil law country like Finland and even if the quantitative measure so CEP are employed in the analysis. GHG emissions emerge as the most important proxy of CEP, having a significant influence on the stock market returns, no matter the way GHG emissions is used in the generic regression model (i.e., amount of GHG emissions, reduction in GHG emissions, or ratio of GHG emissions to sales revenues), whereas water consumption, in all cases, has no significant impact on stock returns. Waste production and energy consumption also emerge as factors having significant influence on the stock market returns if certain measures of CEP are employed (e.g., absolute amount of and reduction in the amount of waste production, and reduction in the amount of energy consumption).

This study is not free of limitations. First, it has relied on a small sample of large (based on market capitalization) Finnish companies. Second, due to unavailability of data, a longer data collection period cannot be considered in this empirical investigation. Third and finally, only a stock market-based measure of financial performance has been used in the empirical analysis to understand the CEP-CFP nexus. These limitations could be overcome in future research by using a sample of large, medium, and small companies, a longer sample period, possibly from various countries to make more comprehensive and generalized inferences. Futures studies should also use a combination of accounting-based and stock market-based measures of CFP to examine the CEP-CFP nexus. Furthermore, future research could investigate the mediating role of corporate environmental disclosure and assurance of sustainability information on the link between CEP and CFP.

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Table 1: Summary of notable studies on the relationship between CEP and CFP

Studies	Key findings
Al-Tuwaijri *et al*., 2004.	Good environmental performance is significantly associated with good economic performance.
Bhat (1998).	The degrees of environmental compliance have a positive influence on the profit margins.
Busch & Hoffmann (2011).	Inconclusive result. CEP pays off when carbon emissions are used as an outcome-based measure of CEP. But when carbon management is used as a process-based measure of CEP, a negative relationship between better CEP and CFP is found.
Capece *et al*. (2017).	Companies with green vision experience better financial performance.
Cordeiro & Sarkis (1997).	There is a significantly negative relationship between CEP and CFP.
Cormier & Magnan (1997).	Negative relationship between CEP and CFP for paper, chemical and oil refining firms. The evidence is weak for steel, metal and mining firms.
Elsayed & Paton (2005).	CEP has a neutral effect on CFP.
Earnhart & Lízal (2007)	No conclusive result. CEP neither improves nor undermines CFP.

Gottsman & Kessler (1998).	The use of quantitative environmental screening criteria does not cause an index fund to deviate from its market benchmark
Gupta & Goldar (2005).	Weak CEP leads to negative abnormal returns of up to 30%.

Halkos & Sepetis (2007).	Market responds positively to improved environmental management system and environmental performance
Hart & Ahuja (1996).	CEP in the form of efforts to reduce emissions results in the improvement of CFP within one to two years after the efforts are made.
Hughes (2000).	The CEP of environmentally exposed firms has negative impact on the market value of equity.
Jaggi & Freedman (1992).	Inconclusive result.
King & Lenox (2001).	There is an association between lower pollution and higher financial performance but such connection is caused by a firm's fixed characteristics and strategic position.
Konar & Cohen (2001).	A reduction in emissions of toxic chemicals leads to an increase in market value but the effect of changes in emissions of toxic chemicals varies across industries.
Nakao *et al*. (2007).	Improved CEP leads to better CFP and vice-versa.
Russo & Fouts (1997).	Better environmental performance improves corporate financial performance and the linkage between environmental performance and financial performance is moderated by industry growth.
Telle (2006).	Inconclusive result.

Thomas (2001).	Adoption of an environmental policy is associated with superior economic returns to shareholders.

Wagner (2005).	When the emissions-based measures of CEP are used, a predominantly negative relationship between environmental and economic performance is found, whereas for the inputs-based measures of CEP, no significant link is found.
Wagner *et al*. (2002).	The relationship between CEP and CFP is uniformly negative.
Wang *et al*. (2014).	Higher carbon emissions lead to a stronger Tobin's q.
Watson *et al*. (2004).	The implementation of an EMS does not negatively impact a firm's financial performance.

Table 2: Variables definition and measurement

Key variables	Definition
Dependent variable	
Stock market returns	Annual stock market returns of a firm.
Independent variable	
Corporate environmental performance:	
i. GHG	Log of total GHG emissions.
	Percentage change in the total amount of GHG emissions.
	Total GHG emissions/total sales.
ii. Energy	Log of total energy consumption.
	Percentage change in the total amount of energy consumption.
	Total energy consumption/total sales.
iii. Waste	Log of total waste production.
	Percentage change in the total amount of waste production.
	Total waste production/total sales.
iv. Water	Log of total water consumption.
	Percentage change in the total amount of water consumption.
	Total water consumption/total sales.
Control variables	
Profitability (return on assets)	Net income/total assets.
Leverage	Total debt/total assets.
Research and development intensity	Research and development expenses/total sales.
Growth	Percentage change in sales.

Table 3: Pearson correlations

	GHG	Energy	Water	Waste	Profitability	Leverage	R&D Intensity	Growth
GHG	1							
Energy	0.96	1						
Water	0.90	0.91	1					
Waste	0.92	0.94	0.90	1				
Profitability	-0.39	-0.35	-0.37	-0.45	1			
Leverage	0.21	0.21	0.11	0.31	-0.50	1		
R&D Intensity	-0.12	-0.20	-0.13	-0.35	0.27	-0.19	1	
Growth	0.20	0.05	0.08	0.06	-0.11	0.16	0.01	1

Notes: This Table shows the Pearson correlations amongst the variables under study.

Table 4: Descriptive statistics

	Mean	Maximum	Minimum	Std. Dev.
GHG	5.138010	6.354265	4.431364	0.624301
Energy	8.661131	9.921629	7.975432	0.630437
Water	8.923784	10.62531	7.401704	0.995876
Waste	4.541945	6.260674	3.875061	0.739046
Profitability (ROA)	6.603226	23.60000	-10.80000	8.405811
Leverage	0.432258	1.700000	0.000000	0.326993
R&D Intensity	0.051483	0.207673	0.003361	0.064166
Growth	0.051684	0.889271	-0.578837	0.223467

Notes: This Table shows the summary statistics for the variables under study.

Table 5: Regression results with amount of GHG emissions, water production, and energy and water consumption as independent variable

	Model 1	Model 2	Model 3	Model 4
GHG	-1.68 (-3.49)***			
Energy		0.88 (0.38)		
Water			-4.90 (-1.01)	
Waste				-6.31 (-4.88)***
Profitability (ROA)	-1.79 (-2.21)**	-3.04 (-2.61)***	2.76 (2.31)**	-3.35 (-2.71)***
Leverage	2.35 (2.14)**	-2.01 (-0.15)	-1.57 (-0.80)	-1.30 (-0.08)
R&D Intensity	5.87 (2.57)**	7.72 (9.78)***	2.82 (2.29)**	3.02 (2.01)**
Growth	2.11 (1.75)*	-1.89 (-1.41)	3.39 (1.76)*	-1.49 (-1.59)
R^2	0.536	0.258	0.290	0.353
N	165	162	162	161

Notes: Values in ( ) are *t*-statistics. *, ** and *** indicate the statistical significance at the 10%, 5% and 1% levels.

Table 6: Regression results with reduction in the amount of GHG emissions, water production, and energy and water consumption as independent variable

	Model 1	Model 2	Model 3	Model 4
GHG	-10.11 (-3.61)***			
Energy		5.17 (2.18)***		
Water			-0.49 (-0.03)	
Waste				4.55 (2.98)***
Profitability (ROA)	-6.93 (-2.90)***	-2.58 (-3.82)***	3.82 (2.18)**	4.93 (2.16)**
Leverage	-2.73 (-1.75)*	-3.31 (-1.94)*	-0.42 (-1.08)	-2.23 (-1.38)
R&D Intensity	-6.22 (-2.87)***	9.18 (4.57)***	3.68 (2.81)***	2.76 (2.18)**
Growth	-1.07 (-0.43)	-1.05 (-0.67)	-5.52 (-4.32)***	-1.92 (-0.96)
R^2	0.376	0.431	0.388	0.489
N	165	162	162	161

Note: See notes to Table 5

Table 7: Regression results with ratio of GHG emissions, water production, and energy and water consumption to sales as independent variable

	Model 1	Model 2	Model 3	Model 4
GHG	-10.19 (-4.86)***			
Energy		-2.22 (-0.35)		
Water			0.24 (0.20)	
Waste				0.76 (0.13)
Profitability (ROA)	-1.42 (-2.28)**	-0.12 (-0.39)	-0.15 (-0.36)	0.13 (0.39)
Leverage	-1.31 (-0.15)	-0.09 (-0.01)	0.65 (0.08)	1.74 (1.91)*
R&D Intensity	5.77 (3.08)***	1.72 (2.86)***	2.64 (2.23)**	2.01 (2.31)**
Growth	-2.06 (-1.69)*	-2.88 (-2.64)***	1.95 (2.09)**	1.14 (1.71)*
R^2	0.219	0.114	0.108	0.140
N	165	162	162	161

Note: See notes to Table 5..