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Does Corporate Social Responsibility improve financial performance? -evidence from pure green side

 Yang WANG , Jun Liu , Xiuping Sui , Libing Liu

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This paper discusses the causal effects of environment protection expenditure on the financial performance of the company, analyzing the data from different region and scale companies.

The empirical result shows that the environment protection expenditure, which seems to be pure green cost can improve the financial performance of the company.

The effect varies with the company's location and scale, the less opening area and smaller companies will have more intensive influence, because they are more affected by financial constraints.

Does Corporate Social Responsibility improve financial performance?

-evidence from pure green side

Yang WANG,

School of Economics, Capital University of Economics and Business

E-mail:rucwy@126.com

Jun Liu

School of Marxism, Capital University of Economics and Business

E-mail: heyliujun@126.com

Xiuping Sui

School of International Trade and Economics, University of International Business and Economics

E-mail sui_xp@163.com

Libing Liu

State Information Center

llb@sic.gov.cn

Abstract

This paper discusses the causal effects of environment protection expenditure on the financial performance of the company, analyzing the data from different region and scale companies. Using a large panel of Listed companies in China from 2012-2017, we introduce average CSR Index by province and propose the green design expenditure to overcome the endogenous problem and find some meaningful results. First, the environment protection expenditure, which seems to be pure green cost can improve the financial performance of the company. Second, the effect varies with the company's location and scale, the less opening area and small companies will have more intensive influence, because they are more affected by financial constraints. Thirdly, the effect in more related to "Green", the green design fees will also have positive effect than other expenditure.

1. **Introduction**

Corporate Social Responsibility (CSR) in listed companies has gradually become a key indicator for measuring corporate reputation (Ansoff, 1965). The importance of CSR can for example be seen when looking at companies' financial performance which is increasingly affected by CSR evaluation (Amran & Nejati, 2014). Investigating the relationship between the two is not only conducive for the sustainable development of companies, but also promotes a social and ecological civilization (Barnett & Salomon, 2002).

This paper investigates the effect of green cost, specifically environmental protection expenditure, as a main influence factor on the financial performance of listed companies in China. Unlike other CSR evaluation indexes such as charity or human rights protection, which are commonly known to improve the reputation or the market value of the company, environmental protection expenditure at first seems to be just a pure cost factor (Basu & Palazzo, 2008; Oeyono & Samy, 2011). The Chinese government is attempting to guide companies towards a sustainable development which is not utilitarian and aims to encourage firms to develop green products and services (Ahmed, et al., 2012). Taking these conditions into consideration, this article investigates the function of environmental protection fees to evaluate their causal effect not only on the financial performance of firms but also on the sustainable development of a company (Mathieu & Gomes, 2019). We also include CSR reports to solve the study's endogeneity problem and confirm the reliability of the findings.

Our analysis mainly relies on a large data set of annual financial reports of listed companies in China from 2012-2017. Analyzing this data set yields several findings. First, environmental protection expenditure, which seems to be pure green costs, can improve the financial performance of a company. Second, the effect varies with a company's location and scale. Smaller companies and companies in less developed areas are more strongly influenced, as they are more affected by

financial constraints. Thirdly, the effect is more related to "Green", the green design fees will also have a more positive effect than other expenditure. The remaining paper is structured as follows: Section 2 briefly reviews the related literature and presents our hypotheses. Section 3 introduces the model, data, and methodology. Section 4 provides empirical results and analysis. Finally, section 5 reviews the main findings and concludes.

1. Literature Review

Previous literature demonstrates that a company's financial performance is increasingly affected by CSR evaluation (Bowen, 1953; Preston & Bannon, 1997). Efficient firms exhibit increased performance when improving reputation by investing in social welfare such as charity, staff welfare and environmental protection (Simpson & Ko-hers, 2002). The reputation can thereby be seen as an intangible asset of the company (Bauer, Koedijk & Otten, 2005). CSR will improve goodwill and reputation, which promotes financial performance (Barretta, 2019). In turn, good financial performance will enable enterprises to invest more in socially responsible activities. Consequently, CSR and corporate performance positively influence each other. Furthermore, this effect varies in different sectors (Ilhan-Nas, Koparan & Okan, 2018). In this paper we focus on the part of CSR which deals with environmental sustainability. Specifically, we analyze the influence of a firm's environmental protection expenditure on its financial performance.

Based on this, our hypothesis is as follows:

Hypothesis 1: Environmental protection expenditure significantly improves the financial performance of the company.

More specifically,

Hypothesis 2: Environmental protection expenditure more significantly improves the financial performance of small companies and companies in less developed areas.

Hypothesis 3: Environmental protection expenditure significantly improves the financial performance of a company by investing more in green initiatives such as green design.

2. Data and Model

2.1 Data

The data used in this paper was collected from the annual financial reports filed by firms listed on the Shanghai and Shenzhen stock exchange during the period from 2012 to 2017. Our data covers various types of firms from 20 industries and includes firms from different areas of China and different sizes. To improve the data quality, we drop outlier observations in our estimations. Finally, our unbalanced panel covers 505 listed companies, resulting in a total of 3138 observations over the six-year period.

2.2 Model

Before we define our model, we introduce the variables of the analysis. While previous studies focus on the overall CSR report score (Oeyono & Samy, 2011; Ilhan-Nas, Koparan & Okan, 2018), we only focus on the green part of CSR and therefore do not include charity, reputation or other endogenous variables in our analysis (Changa, 2019). Consequently, we only use the environmental protection expenditures for our model, which are disclosed every year in the annual report. We choose earnings per share (EPS) as the index of financial performance, as it reflects the evaluation of all stakeholders.

Table 1 statistic description

Variable	Obs	Mean	Std.Dev.	Min	Max
code	3138	312000	287000	5	604000
year	3138	2014.141	1.976	2011	2017

nmargin	3124	321.383	1413.687	-17000	29006.42
roa	3124	3.764	16.065	-87.391	710.894
eps	3124	.313	.961	-14.54	21.56
roe	3090	4.046	49.849	-1687.13	949.801
mfee	3124	399.4	824.159	4.643	16599.84
epfee	3138	8.638	24.711	-4.022	477.204
h	3075	.174	.123	0	.865
z	3075	.591	.561	.004	3.035
noc	3075	1.607	.659	1	4
rdfee	2650	125.031	273.17	.19	1895
alr	3124	47.59	23.879	-19.47	326.19
fc	2954	-3.576	.267	-4.11	-2.911
fs	3124	8.03e+09	2.05e+10	6920000	2.66e+11
wcpt	3123	178.602	3236.019	-13500	15255.25
region1	3138	.225	.418	0	1
region2	3138	.529	.499	0	1
fs1	3138	.195	.396	0	1
alr1	3138	.456	.498	0	1
nature1	3138	.459	.498	0	1
nature2	3138	.022	.147	0	1
nature3	3138	.03	.17	0	1
crs	3134	3.816	3.695	-15	22.21
avpcrs	3138	3.813	1.068	-2.75	9.92
avicrs	3138	3.813	1.366	-2.09	15.098
shr	3134	12.36	6.783	-12.67	27.94

Our model specifications are as follows:

$$EPS_{i,t+1} = \alpha_0 + \beta_1*Epfee_{i,t} + \beta_2*rdfee_{i,t} + \beta_3*region_{i,t}*expend_{i,t} + \beta_4* avpcrs_{i,t}*region_{i,t} + \beta_5X_{i,t} + \varepsilon_{i,t,}$$

where $EPS_{i,t+1}$ represents the earnings per share which is a proxy for the evaluation of a firm's financial performance. $Epfee_{i,t}$ represents the environmental protection expenditure, which captures the green part of CSR. $rdfee_{i,t}$ is the research and development (R&D) expenditure of a firm, which is also disclosed in the annual reports. Other variables are defined as follows:

Table 2 Variables description

Variable	Meaning
eps	Earnings Per Share
epfee	Environment Protection Expenditure
rdfee	Research & Development Expenditure
grdfee	Green Research & Development Expenditure
wcpt	Working Capital
alr	Asset Liability Ratio
hhi	Ownership Concentration: Sum of the square of the top five shareholding ratio
equib	Equity Balance: Sum of the top two to top five shareholding ratio over shareholding ratio of the largest shareholder
SA	Financial Cost: Index SA
region	Region Dummy: Take 1 if the company is registered in the eastern of China
*Re*ep*	Intersection of region1 & epfee
fs1	Company Size Dummy: Take 1 if the operating revenue is above the average level of all companies

Av-crs	Average Company Social Responsibility Index by Province
nmargin	Net Margin

Empirical Analysis

4.1 Empirical Results

Table 3 baseline regression

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)
				Dependent Variable is EPS			
			OLS				GMM
epfee	0.466***	0.434***	0.538***	0.499***	0.505***	0.512***	1.647***
	(0.150)	(0.145)	(0.148)	(0.143)	(0.143)	(0.143)	(0.361)
rdfee		0.020*	0.024**	0.023**	0.024**	0.023**	0.022
		(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.022)
wcpt	0.005***		0.010***	0.007***	0.007***	0.007***	0.006***
	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
alr	-0.015***	-0.016***		-0.013***	-0.013***	-0.013***	-0.015***
	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.002)
hhi	0.327	0.329	0.371		0.218	0.341	0.395
	(0.279)	(0.293)	(0.298)		(0.277)	(0.289)	(0.436)
equib	-0.003	0.076*	0.149***	0.055		0.070	0.042
	(0.047)	(0.046)	(0.046)	(0.043)		(0.045)	(0.066)
SA	0.699***	0.551***	0.775***	0.651***	0.599***	0.606***	0.426*
	(0.138)	(0.145)	(0.147)	(0.138)	(0.143)	(0.143)	(0.219)
Constant	3.379***	2.812***	2.806***	3.097***	2.920***	2.870***	3.831***
	(0.507)	(0.527)	(0.535)	(0.482)	(0.518)	(0.518)	(0.954)
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2953	2492	2491	2491	2491	2491	2056
R-squared	0.143	0.112	0.083	0.140	0.139	0.140	
Number of code	646	572	571	571	571	571	548

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4 Heterogeneity about region and scale

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Dependent Variable is EPS					
	OLS	GMM	OLS	GMM	OLS	GMM
epfee	1.559***	4.153***	0.499***	1.628***	1.505***	4.119***
	(0.244)	(0.725)	(0.143)	(0.360)	(0.244)	(0.724)
reep	-1.558***	-3.750***			-1.497***	-3.718***
	(0.295)	(0.774)			(0.295)	(0.773)
fs1			0.239***	0.223**	0.221***	0.195**
			(0.062)	(0.093)	(0.062)	(0.096)
rdfee	0.026**	0.039*	0.014	0.013	0.018	0.031
	(0.011)	(0.023)	(0.012)	(0.023)	(0.012)	(0.023)
wcpt	0.007***	0.006***	0.006***	0.006***	0.007***	0.006***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
alr	-0.013***	-0.015***	-0.013***	-0.015***	-0.013***	-0.015***
	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)
hhi	0.328	0.300	0.269	0.297	0.262	0.215
	(0.287)	(0.443)	(0.288)	(0.437)	(0.286)	(0.443)
equib	0.071	0.050	0.060	0.031	0.063	0.041
	(0.045)	(0.067)	(0.045)	(0.066)	(0.045)	(0.067)
SA	0.614***	0.543**	0.613***	0.425*	0.620***	0.541**
	(0.142)	(0.225)	(0.142)	(0.218)	(0.142)	(0.225)
Constant	2.881***	4.463***	2.890***	3.714***	2.899***	4.356***
	(0.515)	(0.983)	(0.517)	(0.953)	(0.513)	(0.982)
Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2491	2056	2491	2056	2491	2056
R-squared	0.153		0.147		0.158	
Number of code	571	548	571	548	571	548
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1						

Table 5 Endogenous analysis with CSR report

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	EPS							
	2SLS							
epfee	8.490*	6.911*	4.347*	5.013*	4.790*	4.714*	8.585*	4.265*
	(5.145)	(3.891)	(2.571)	(2.878)	(2.688)	(2.643)	(4.929)	(2.565)
reep							-8.466*	

								(4.852)
fs1								0.174***
								(0.065)
rdfee		-0.088	-0.044	-0.055	-0.050	-0.050	-0.006	-0.050
		(0.062)	(0.041)	(0.045)	(0.042)	(0.042)	(0.020)	(0.040)
wcpt	0.007***		0.008***	0.007***	0.007***	0.007***	0.007***	0.007***
	(0.002)		(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
hhi	0.930*	1.390*	0.980*		0.795*	1.028**	0.657*	0.903*
	(0.562)	(0.741)	(0.505)		(0.482)	(0.521)	(0.378)	(0.509)
equib	0.089	0.171**	0.173***	0.096**		0.139***	0.130**	0.127**
	(0.066)	(0.072)	(0.050)	(0.046)		(0.053)	(0.052)	(0.051)
SA	1.185**	0.642***	0.670***	0.763***	0.596***	0.606***	0.567***	0.591***
	(0.535)	(0.245)	(0.176)	(0.238)	(0.186)	(0.185)	(0.177)	(0.176)
alr	-0.006***	-0.009***		-0.006***	-0.007***	-0.006***	-0.006***	-0.007***
	(0.001)	(0.001)		(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Constant	3.896***	2.171***	2.067***	2.856***	2.222***	2.118***	2.079***	2.110***
	(1.463)	(0.703)	(0.520)	(0.688)	(0.550)	(0.539)	(0.547)	(0.510)
Fexed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2953	2492	2491	2491	2491	2491	2491	2491
Number of code	646	572	571	571	571	571	571	571

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

4.2 Discussion of empirical results

Table 3 depicts the baseline results of the impact of environmental protection expenditure on firm performance. It further illustrates its effect on R&D fees, share concentration, working capital, asset ratio and equity balance. We also use several measurement proxies (e.g. x, y and z), to include mechanisms such as financial constraints (SA index). We apply the OLS and GMM methods to test the results when omitting and including control variables respectively. Our findings provide strong evidence that environmental protection expenditure can significantly increase a company's EPS (at a 1% significance level with marginal effects of 4.6%, 4.3% and 5.4%, respectively). These findings support hypothesis 1.

Furthermore, we include the different regions and sizes of companies, to test for heterogeneity issues. We therefore divide China into three areas based on their level of development: west (less developed), middle (developing), east (developed), and find that the financial performance of companies in western areas (less developed) is more strongly influenced (row 2 and 9 in Table 4) by environmental protection expenditure due to financial constraints. The small companies (column 1-2 in Table 4) are also more strongly influenced. The findings in Table 4 support hypotheses 2 and 3, indicating that increased environmental protection expenditure in small firms and western areas has a stronger effect on firm performance.

To counteract a potential endogeneity problem, we introduce CSR reports as an instrumental variable. The results show that whether the company issued a CSR report or not was closely related to its financial performance. In addition, the authors introduce $Grdfee_{i,t}$, the green research and development expenditure, as a variable, which denotes the number of a company's green patents. This variable was

drawn from the statistics of the China Green Patent Report (2012-2017) to further test the effect of green

behavior on financial results.

Finally, we replace EPS with net margin to test the robustness of the empirical analysis and the result is still significant.

Table 6   Robustness Test

VARIABLES	(1)	(2)	(3)	(4)
	Dependent Variable is Net Margin			
	OLS		GMM	
epfee	2.148*	7.586***	35.745***	25.562***
	(1.225)	(2.219)	(4.435)	(5.998)
rdfee		0.608***		0.919**
		(0.179)		(0.371)
wcpt		0.158***		0.154***
		(0.014)		(0.023)
alr		-0.075***		-0.117***
		(0.018)		(0.030)
h		-2.475		0.365
		(4.476)		(7.247)
z		0.468		0.102
		(0.698)		(1.091)
fc		0.209		-3.847
		(2.218)		(3.637)
Constant	3.028***	5.600	0.178	-16.368
	(0.186)	(8.042)	(4.436)	(17.756)
Fixed Effect	Yes	Yes	Yes	Yes
Observations	3124	2491	2441	2056
R-squared	0.001	0.103		
Number of code	659	571	622	548
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1				

5. Conclusion

Using dynamic panel data of companies listed in China between 2012 and 2017, we analyzed

environmental protection expenditure's effect on financial performance. Thereby we investigated data

from different areas and sizes of companies. We find that CSR, specifically the environmental protection part, plays an important role in improving the financial performance of a company.

Furthermore, our results show that smaller firms are more strongly affected because they suffer from more centralized power and higher financial constraints. Furthermore, the companies in less developed areas are more strongly influenced because they are more prone to accept the high pollution enterprises rejected by developed areas. Finally, we find that the green research and development activities also have intensive effects on financial results.

This paper shows that environmental protection expenditure improves the financial performance of companies. Thereby, it informs that not only reputation or charity, but also the green part of CSR such as green research and development investments has a significant influence on the financial performance of companies. This suggests that every aspect of CSR can improve the overall economic result of a company.

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