Revisiting the link between environmental performance and financial performance: who cares about private companies?

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Abstract

Purpose: The financial market change and the climate change in recent years have triggered the studies of the connection between corporate carbon performance and financial performance, although the link between the two remains elusive in private companies. This study examines the relationship between environmental and financial performance with a particular focus on private companies.

Design/methodology/approach: This study compares public listed and private unlisted companies registered under the Australian NGER Act 2007 and investigates the link between carbon performance and financial performance in these two groups of companies during 2009 and 2010.

Findings: The results show that carbon performance and financial performance are significantly negatively related in public listed companies, suggesting worse carbon performers tend to enjoy higher financial returns and stronger financial performers are more likely to pollute more and consume more energy. In private companies, no significant link between the two performances is found.

Research limitations/implications: These results may provide two implications. First, private companies which rely more on direct cost savings but less external stakeholder rewards on their environmental responsibility have not perceived that carbon management is value creation. Second, although public companies tend to receive much higher public pressures and more external stakeholder rewards, these pressures and rewards have not been linked with companies' ability to manage and reduce pollution. This is particularly the case in Australia where a large number of NGER registered companies are emission intensive companies which keep receiving external financial rewards regardless of their heavy emissions.

Originality/value: Increasing literature believes that embracing environmental responsibility will create financial value. However, this claim focuses on large listed companies only. This study makes a first attempt to examine this claim in private companies, which are equally heavy polluters, but subject to much less public scrutiny.

Key words: Carbon performance, financial performance, carbon emission, energy consumption, stakeholder theory

1. INTRODUCTION

With the deepening of Global Financial Crisis (GFC) and the debt crisis spreading across European Union countries and the United States, the global financial market is experiencing unprecedented complexity and uncertainty. Dealing with such challenges has made companies' financial performance more important than ever to their investors, lenders and other stakeholders.

The environment too has achieved new prominence. With a growing consensus that global warming is real and that corporations contribute significantly to climate change, carbon tax legislation was introduced into the Australian Parliament and passed in late 2011. The enactment of the Australian National Greenhouse and Energy Reporting (NGER) Act in 2007 made carbon disclosure mandatory for high polluting entities. It is unlikely that anyone involved even on the periphery of business research (either accounting or management) is unaware of corporate social responsibility, and now, corporate carbon responsibility. Corporate carbon performance and efficiency is now under close scrutiny by all corporate stakeholders including investors and government regulators.

The financial market change and the climate change have triggered the studies of the connection between economic and environmental performance in the past decade, although the link between the two remains elusive. The earlier school of research argues that environmental regulation imposes additional costs to business (Walley and Whitehead, 1994; Parmer et al., 1995). The cost of compliance and being socially responsible will translate into higher product price, a competitive disadvantage and lower profitability (Aupperle et al., 1985; Guerard, 1997). More recent studies tend to support environmental performance as a forward-looking measure of corporate financial performance (Guenster et al., 2011; Konar and Cohen, 2001). Porter and van der Linde (1995) contend that proper designed environmental regulation may stimulate environmental innovation which can partly or perhaps fully offset regulatory compliance costs. Improved environmental performance can enhance corporate efficiency and thus create a competitive advantage (Derwall et al., 2005). In a meta-analysis of the relationship between environmental performance and financial performance, Horvathova (2010) criticised that finding a negative link between environmental and financial performance is largely attributed to the empirical method used,

for example, using simple correlation analysis such as in Aragon-Correa and Rubio-Lopez (2007), instead of more advanced econometric analysis. Molina-Azorin et al. (2009) reviewed a large volume of prior studies on the impact of green management on financial performance and reported that although results are mixed, studies where a positive impact of environment on financial performance is obtained are prevalent in extant literature.

While the debate over the relationship between environmental and financial performance is still unresolved, it seems that the perceived positive link between the two performances has begun to encourage good citizenship in business practice. The KPMG's (2011) recent international survey of the world top 250 companies showed that 95% of the world largest companies have reported their corporate social and environmental responsibility, compared to 80% in the 2008 survey (KPMG, 2008) and only 52% in the 2005 survey (KPMG, 2005). The KPMG's (2011) report has showed a strong belief that corporate responsibility reporting enhances financial value. This supports the theory in the literature arguing that the benefits of social and environmental initiative outweigh their costs and embracing environmental responsibility will create financial value (Derwall et al., 2005).

However, the KPMG's (2011) survey also reveals that public companies (69%) are more likely to disclose responsible information than their private counterparts. It appears that the positive effect of environmental responsibility on financial benefits has not been fully embraced by large numbers of private companies. The question therefore is whether the (positive) link between environmental and financial performance exists in private companies. It has been argued that financial value can be created either by direct cost savings through waste reduction, energy efficiency, etc. or enhanced image and reputation in the market which provides companies with reputational dividends from investors and consumers, or both (KPMG, 2011, p.3). Large listed companies are more likely to attract greater political and regulatory pressures and have greater dependence on external stakeholders with diverse interests (Brammer and Pavelin 2006; Lee, 2009). Their financial value creation can be sourced from both internal cost savings and external reputational rewards, and sometimes, the latter benefits can be larger. In contrast, private companies (including those state-owned and foreign owned unlisted companies) do not offer, trade or exchange their shares to the public. They are much less exposed to the public and subject to public scrutiny. Their ownerships are often concentrated in a few individuals and their key stakeholders are limited because of their

less dependence on external influence and less involved in debts compared with publicly traded companies (Lee, 2009; Dun & Bradstreet, 2007). All of these characteristics of private companies potentially make them receive less or less reliant on receiving rewards from external stakeholders because of their improved environmental images. If external source of benefits are perceived inadequate, private companies have to be more reliant on benefits generated internally such as direct cost savings and improving efficiency to outweigh costs for environmental management. If value creation has to be more reliant on internally generated environmental benefits for private companies, in comparison with publicly traded companies where external rewards can be an important source of value creation, will environmental improvement result in positive financial returns?

Previous research has not provided any answer to the question as to the link between environmental and financial performance in private companies as prior studies are predominantly limited to publicly listed companies where data are readily available. In reality, private unlisted companies far outnumber those listed. There are over one million private companies in Australia, compared to only around 2,000 listed companies. In the top polluters list under the Australian NGER Act (2007), Australian Stock Exchange (ASX) listed companies only account for one third of the list, the remaining two third entities are private or publicly unlisted entities. In financial terms, it might be justifiable to focus on public companies only, as public companies may have stronger economic influence and they are larger employers than their private counterparts (Dun & Bradstreet, 2007). In environmental terms, however, their pollution levels do not show much difference. According to the emission data in the Australian NGER during 2008 and 2010, average emissions generated by ASX listed companies are 1.4 million tonnes while by private unlisted companies are 2 million, which is 0.6 million tonnes more emissions per company. The average energy consumption in both public and private companies is around 30 million gigajoules. Therefore, motivated by the gap in corporate practice as well as in extant literature, this study uses recently released carbon emission data by large heavy polluting companies listed under the NGER to investigate the validity of the claim on the impact of environmental improvement on financial value creation, comparing private untraded companies with ASX listed companies.

The remainder of the paper is structured as follows. In Section 2, extant literature is reviewed, which assists in generating hypothesis. Section 3 discusses data collection and sample selection, followed by a discussion of the results in Section 4. The paper draws conclusions in Section 5.

2. LITERATURE AND HYPOTHESIS

From good environmental performance to good financial performance

The debate on the link between corporate environmental performance and financial performance is still inconclusive (Porter and Kramer, 2006), although the positive relationship between the two is frequently reported (Russo and Fouts, 1997; Nakao et al., 2007). Many researchers believe business can do well by doing good, and therefore the business case, i.e. win-win, is the way to move towards sustainability (e.g. Schaltegger and Wagner, 2006; Falck and Heblich, 2007). The economic benefits of managing social and environmental performance may include reducing cost and business risk, increasing reputation and developing new market such as green product market. However, substantial investment may be required to generate these benefits. Earlier works challenged the "win-win" solution, and argued that environmental responsibility costs fortune and it is not easy being green (Aupperle et al., 1985; Walley and Whitehead, 1994). Some recent works echo that sustainability initiatives could destroy corporate value and increase financial risk and uncertainty (Kiernan, 2007; Seeger and Hipfel, 2007). Sustainability is worth pursuing only when it can clearly satisfy the profit maximisation motive.

The puzzle of the link between environmental and financial performance has led to increasing empirical examinations on their relationship in the past two decades. It appears that empirical works largely support the positive relationship between the two performances (Molina-Azorin et al., 2009). The "win-win" result prevails in relationships between financial and environmental performance (Wahba, 2008), financial and social performance (Spicer, 1978; Waddock and Graves, 1997), financial performance and corporate social responsibility (Schnietz and Epstein, 2005), and more recently financial performance and corporate sustainability (Lo and Sheu, 2007).

The empirical evidence has focused on corporate financial performance as well as stock market performance, predominantly in the US market. For example, Russo and Fouts (1997) investigated environmental ratings of 243 US firms and found it pays to be green and environmental performance significantly contributes to corporate financial performance. Karagozoglu and Lindell (2000) examined environmental strategy and competitive advantage of 83 US companies across high-tech and traditional manufacturing sectors and confirmed that "win-win" exists in different sectors of industries. Focused on industry emissions, King and Lenox (2001, 2002) used different methods and environmental variables to explore the locus of profitable pollution reduction in US manufacturing firms. They found a positive relationship between firm emission levels and financial evaluation. Also, firms with lower emissions in their industries tend to experience higher market performance a year later, which suggests a potential causal relationship between environmental and financial performance. Similarly using Tobin's q as a measure of share market performance, Konar and Cohen (2001) found that stock market does value environmental performance. Worse environmental performers tend to experience worse market valuation.

A number of more recent studies examined both financial and market value. Menguc and Ozanne (2005) investigated the environmental orientation and business relationship in Australian manufacturing firms and found that higher rank of natural environment orientation (NEO) is positively associated with higher market share price and profit after tax. Lo and Sheu (2007) found a significantly positive relation between corporate sustainability and its market value supporting that being sustainable causes a firm to increase its value. Guenster et al. (2011) found that eco-efficiency, defined as a firm's ability to create more value while using fewer environmental resources, is positively linked with corporate financial as well as share market value.

Instead of looking at the one way effect, several studies have examined the interactions between corporate environmental and financial performance and reinforced their positive link. Using the lead and lag effect approach, Waddock and Graves (1997) found that corporate social performance is positively associated with prior as well as future financial performance, which suggests corporate social performance is both a predictor and consequence of firm financial performance. Nakao et al. (2007) also supported the environment–economy two-way interaction. They examined environmental performance in 278 Japanese listed firms and

revealed that environmental performance significantly impact financial performance and better financial performance also results in improved environmental performance.

Development of hypothesis

The arguments for the positive link between environmental and financial performance are based on two distinct but interrelated perspectives: the internal management perspective and the external stakeholder relationship perspective. From the internal management perspective, previous studies argue that better environmental management can lead to cost advantage (Christmann, 2000), better product pricing (De Beer and Friend, 2006), more product innovation (Wagner, 2005), all of which will result in the development of competitive advantage and thus creating financial value (Sharma and Vredenburg, 1998; Derwall et al., 2005; Lopez-Gamero et al., 2009). The stakeholder perspective focuses on the rewards from better stakeholder relations. It argues that attention to social and environmental responsibility improves relationship with key stakeholder groups, such as investors, creditors and customers, which prevents costly stakeholder conflicts and leads to better financial performance (Hull and Rothenberg, 2008). Both legitimacy and stakeholder theories share a conceptualization of organisations being embedded within a wider social system that shapes their behaviour (Lindblom, 1994; Suchman, 1995; Deegan, 2002). Stakeholders could confer a legitimacy status to a company because of their positive perceptions of the company's environmental behaviour or deprive of the "state" of legitimacy if the company is perceived as being inappropriately or unacceptably managing their environmental responsibility (Deegan, 2002). More importantly, once the legitimacy status is obtained, key stakeholders may reward companies with a range of benefits including increased access to resources, increased sales, reduced cost of capital, reduced stakeholder management costs, all of which will result in financial value creation (Berrone and Gomez-Mejia, 2000).

These two common justifications for the positive link between environmental and financial performance may work for large public companies, which has been empirically tested and supported in many previous studies, although it is unsure which justification prevails. Compared with publicly listed companies, private companies are less exposed to the public arena, therefore a decreased risk of public scrutiny and social sanctions (Lee, 2009). Environmental performance in a public company may be effectively analysed and

judgements aggregated by financial analysts and investors, immediately affecting its market position and valuation. Such form of financial rewards or punishments is less likely to be immediately reflected in private firms. Therefore, from the external stakeholder management perspective, private companies may perceive a lower benefit or reward from their stakeholders for better environmental management. This could make private companies more dependent on direct value creation from environmental innovation, cost reduction and energy efficiency than their public counterparts.

It has been widely accepted that it takes time for better environmental management to be translated into direct financial value (Konar and Cohen, 2001; Horváthová, 2010). Compared with public firms, private companies could be more difficult to achieve growth and finance. Private companies may be more likely to allocate limited resources to core areas of the business to maintain profit in the short term instead of waiting for long term financial benefits generated from environmental management. This may be particularly the case during recent turbulent financial years. Therefore, because of more reliance on direct value creation, perceived less external rewards, and more constraints in limited resource allocation, private companies may be less likely to establish positive environmental performance and financial performance nexus. Hence, it is hypothesised that:

H1: Better carbon performance leads to better financial performance in public companies, but not in private unlisted companies.

In a reversed direction of causality, companies achieving higher financial performance may be more likely to have resources available to social and environmental matters and invest in enhancing social and environmental performance to obtain various benefits (Waddock and Graves, 1997). This appears to fit with both public and private firms. Therefore, it is expected that:

H2: Better financial performance results in better carbon performance in both public and private companies.

3. Research method

The environmental data including greenhouse gas emissions and energy consumption information was collected from the Australian NGER 2008-09 and 2009-10[1]. In the 2008-2009 reporting year, corporations that had total greenhouse gas emissions (CO_2 equivalent or CO_2-e)[2] above 125 kilotonnes (KT) or total amount of energy produced or consumed above 500 terajoules (TJ) are required to report. The thresholds change to 87.5 KT and 350 TJ for 2009-2010 and 50 KT and 200 TJ for later years. Under the NGER Act, corporations that meet the thresholds are required to report their Scope 1 greenhouse gas emissions, Scope 2 greenhouse gas emissions, and total energy consumption[3].

In 2008-09, 233 corporations reported their greenhouse and energy data. The number of reporting companies increased to 295 in 2009-10. There are 80 public companies listed in ASX, including 12 companies listed or reporting in one year only. The remainder contains private companies (including foreign- and state-owned unlisted companies) and a few non-

[1] Under the Australian NGER Act 2007 (Section 23), registered controlling corporations are obliged to report information on greenhouse gas emissions and energy consumption to the Greenhouse and Energy Data Officer (GEDO). The GEDO publishes an extract of the information reported since the 2008-2009 financial year. Section 12 of the NGER Act 2007 set an incremental change for the reporting threshold.

[2] According to NGER Act 2007, greenhouse gases include carbon dioxide; methane; nitrous oxide; sulphur hexafluoride; specified kinds of hydro fluorocarbons; and specified kinds of perflurorocarbons. Greenhouse gas emissions are measured as kilotonnes of carbon dioxide equivalent (each gas is multiplied by a global warming potential factor to get an equivalent amount of carbon dioxide).

[3] According to the explanatory information released in 2008-09 and 2009-10 NGER data, Scope 1 emissions are greenhouse gases released into the atmosphere as a direct result of an activity or series of activities that constitute the facility. An example of this would be gases emitted by burning coal to generate electricity at an electricity production facility. Scope 1 emissions are more likely generated by energy intensive (i.e. environmentally sensitive) industries such as oil/gas exploration, mining and minerals, chemicals, transportation, utilities, etc., where greenhouse gas emissions are directly linked to their production processes or activities. Scope 2 emissions are greenhouse gases emitted at a second facility because of the electricity, heating, cooling or steam that is consumed at the facility. An example would be emissions in a car factory because of its use of electricity for lighting. Scope 2 emissions from one facility are part of Scope 1 emissions from another facility. While energy intensive industries may still have high Scope 2 emissions, some non-energy intensive industries may also be heavy Scope 2 emitters because of their consumption of electricity, heating, cooling or steam. Facility-based energy consumption is the use or disposal of energy from the operations of the facility including own use and losses in extraction, production and transmission. As energy may be consumed when it is transformed into other energy products, some forms of energy produced upstream at one facility may be a downstream input for use or conversion to other energy forms at the same or different facility.

corporate organisations, such as universities, local government, unit trust and not-for-profit (NFP) organisations.

The financial information of the NGER registered corporations during 2009 and 2010 financial years [4] were hand-collected from *Company 360˚ Select*. Missing data was supplemented by financial data in *FinAnalysis* which is limited to ASX listed companies. After eliminating non-corporate organisations as well as companies with either missing financial information or environmental information, the sample ends up with 78 public and 147 private companies in 2010 and 70 public and 105 private companies in 2009. The overlapping companies with data in both years include 68 public companies and 102 private companies.

Measurement

Carbon performance is measured by four alternative approaches. The first measurement uses total greenhouse gas emissions released by each company. This is consistent with the environmental performance measurement used in a number of previous studies such as King and Lenox (2002), Wagner et al. (2002) and Wagner (2005). Total emissions are the aggregate of Scope 1 and Scope 2 emissions, reflecting a company's overall responsibility for both direct and indirect emissions. Logarithmic transformation is applied to control variance and reduce skewness.

The second measure uses relative emissions to capture the extent to which a company is more or less polluting compared with other companies in the same industry. The nature of the industry could significantly impact a company's pollution level. For example, oil and gas extraction companies may be significantly more polluting than service companies such as banks. Hence, each company's emissions are compared to the median emissions in its industry to generate an industry relative emission figure for comparison. The classification of industry sectors is based on Global Industry Classification Standard (GICS) adopted by ASX,

[4] It is acknowledged that some private companies may have reporting dates different from a normal financial year used in the NGER. The variation of the reporting period could be between one to six months. Given that financials of a company, such as revenue and earnings, are likely to be consistent in a short period of time, the potential variation generated because of such time difference is considered minimal.

which categorises industries into ten sectors: Energy, Materials, Industrials, Consumer discretionary, Consumer staples, Health care, Financials, Information technology, Telecommunication services, and Utilities.

The third and fourth alternatives use energy consumption information instead of emission data. As facility-based energy consumption directly links to the operations of a company's facilities, it reflects the company's ability to manage and reduce energy use and thus reduce emissions. Similar to the measurements of total and relative emissions, total energy consumption is log transformed and relative energy is generated by comparing individual companies' total energy consumption with its industry median consumption.

Financial performance is measured by return on assets (ROA), consistent with many prior studies such as Russo and Fouts (1997), King and Lenox (2002) and Nakao et al. (2007). To match with environmental performance measured as greenhouse gas emissions and energy consumption from corporate operating processes and activities, return in this study includes operating revenue but excludes other comprehensive income that is not directly attributed to corporate operations, e.g. gains from asset revaluation or foreign currency exchange.

Control variables

Firm size could significantly influence firm performance, including both environmental and financial performance. Therefore, size has been frequently used as a control variable in previous studies (e.g. Waddock and Graves 1997; King and Lenox, 2001). In this study, size is measured as the natural logarithm of total assets. Emission intensity reflects the environmental sensitivity of a company, which could influence a company's environmental performance as well as its environmental strategy and disclosure because environmental issues could attract more attention in heavy emitters such as mining, chemicals and oil/gas explorers and non-environmentally sensitive industries such as retailing (Deegan and Gordon, 1996). Therefore, emission intensity is controlled and measured as "1" representing environmentally sensitive firms in materials, energy, utilities and industrials, and "0" for others. Ownership structure in private companies is initially controlled to see if there is any difference between privately owned and publicly unlisted companies. However, this control variable is not significant in any test. This variable is not reported in the following results.

4. Results

Table 1 presents descriptive statistics of public companies during 2009 and 2010 reporting years.

<Table 1 inserts here>

The descriptive statistics show a slight improvement of carbon performance in 2010 compared to 2009. Total emissions, relative emissions and total energy consumption all reduced in 2010, except for relative energy consumption which had a small increase in 2010. The average size of public companies has increased over the two year periods, while a mixed picture is reported for their financial performance as average ROA slipped in 2010 but the median was slightly higher.

Table 2 presents descriptive statistics of private companies during 2009 and 2010 reporting years.

<Table 2 inserts here>

The trend of performance in private companies shows a similar result. Total emissions, total energy consumption and relative energy all reduced in 2010, but relative emissions in two years are at a similar level. The average size of private companies also increased in 2010. Like their public counterparts, private companies' average ROA decreased in 2010 but the median ROA slightly increased.

To examine the effect of carbon performance on financial performance, four tests were undertaken for public and private companies respectively. A year lag was used to take consideration of the lagged effect of carbon performance improvement on financial value creation. Four measures of carbon performance in 2009 were tested to find whether they were related to corporate financial returns in 2010. The results are presented in Table 3 in models 1 to 4.

<Table 3 inserts here>

Panel A reports the results for public companies. Although all models show significant relationships between different measures of carbon performance and financial returns, the direction of the relationship is unexpected. As carbon performance is measured by companies' environmental impact, either as emissions or energy consumption, the positive results in the models suggest the negative relationship between carbon performance and financial values. The negative relationships revealed in four models are all significant and strong ($p<0.001$ or $p<0.05$), indicating that worse performers tend to have stronger financial returns in a later year. These negative results seem not being affected by whether the firm is in emission intensive industries as intensity is not statistically significant in any model tested.

The results for private companies are presented in Panel B of Table 3. As expected, none of the models reports significant relationship between carbon performance and financial performance, although the sign of the relationship looks positive instead of completely negative in public companies. Emission intensity again shows no effect on firm's financial value creation. In this regard, hypothesis 1 is partially supported as corporate carbon performance seems to have no significant impact on its financial performance in private companies. But surprisingly, those worse carbon performers and heavy emitters appear to enjoy more financial returns even after the stringent disclosure legislation applied in 2007 and emission trading scheme was timetabled during 2008 and 2009. This new evidence in large public listed companies in Australia seems to oppose to what has been argued in many previous studies that better environmental performance leads to higher financial returns.

Table 4 presents the results of financial performance on carbon performance.

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Panel A reports regressions on four measures of carbon performance in public companies. Again, financial performance is significantly associated with future carbon performance measured in various alternative proxies, although it strongly influences total emissions and energy consumptions ($p<0.01$) while its influences on relative emissions and energy are moderately significant ($p<0.05$ and $p<0.10$ respectively). However, the directions of the relationships are negative in all tests, despite of controlling for emission intensity and size of

the company which undoubtedly significantly impact on the company's carbon emissions. This result implies that companies which have stronger financial performance tend to pollute more and consume more energy, as being opposite to the argument that better financial performance results in better environmental performance (Waddock and Graves, 1997; Nakao et al., 2007).

Panel B in Table 4 reports the effect of financial performance on carbon performance in private companies. Contrary to what is hypothesized, financial performance in private companies does link to their carbon performance, suggesting companies achieving higher financial performance do not appear to allocate more resources to environmental matters and invest more to reduce emissions and energy consumption. This is also partially reflected in the results of the size effect. Although larger companies have significantly higher emissions and energy consumption, their relative emissions and energy do not show any difference from smaller companies. Hence, the second hypothesis is not supported.

5. Conclusion

This study explores the link between carbon performance and financial performance in Australian NGER reporting companies. Although prior literature has increasingly supported the claim that improved environmental performance will enhance corporate efficiency, create a competitive advantage and thus create financial value (Porter and van der Linde 1995; Derwall et al., 2005; Guenster et al., 2011), this claim focuses on large listed companies only. It is not clear whether this claim is valid in private companies which are equally heavy polluters, but subject to much less public scrutiny. Therefore, this study makes a comparison of public listed and private unlisted companies registered under the Australian NGER Act 2007. The relationship between carbon performance and financial performance in these two groups of companies during 2009 and 2010 is compared.

The study shows some surprising but interesting results. Contrary to what was expected, it is found that carbon performance and financial performance are significantly negatively related in public listed companies, suggesting worse carbon performers tend to enjoy higher financial returns and stronger financial performers are more likely to pollute more and consume more energy. In private companies, no significant link between the two performances is found,

which means enhancing carbon performance does not significantly create company financial value.

These results may provide two implications. First, private companies which rely more on direct cost savings but less external stakeholder rewards on their environmental responsibility have not perceived that carbon management is value recreation. Therefore, no serious actions have been undertaken to establish such positive link. This seems to suggest that future policy for private companies which are smaller, with limited resources, should be more focused on helping them develop their own carbon management strategies and performance measurement tools. Policy measures supporting company-internal improvements, such as guidelines for carbon management and accounting tools for better carbon management systems, would be advised.

Second, although public companies tend to receive much higher public pressures and more external stakeholder rewards, these pressures and rewards have not been linked with companies' ability to manage and reduce pollution. This is particularly the case in Australia where a large number of NGER registered companies are emission intensive companies of which keep receiving external financial rewards regardless of their heavy emissions. This seems to be consistent with previous studies that focused only on heavy polluting industries. For example, Wagner et al. (2002) and Wagner (2005) examined European pulp and paper industry and found negative and significant effect of environmental performance on financial performance and no evidence of significant impact of financial performance on environmental performance. Similarly, Aragon-Correa and Rubio-Lopez (2007) focused on food industry and found negative relationship too. Studies that focused on broader context seem to be more likely to find a positive link. For example, King and Lenox (2001; 2002), Konar and Cohen (2001) and Merguc and Ozanne (2005) who focused on manufacturing companies only and Karagozoglu and Lindell (2000) who examined high-technology and manufacturing sectors, have all found positive relationships between the two performances. Among the Australian NGER registered companies, energy and materials sectors dominate the list. This may explain why significantly negative relationships have been found in this study. Therefore, future policies for public companies could to be more directed to reinforce stakeholder power, corporate transparency and accountability, promoting the link between

receiving external resources and rewards with companies' ability to manage and reduce emissions.

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APPENDIX:

Table 1: Descriptive statistics for public listed companies

Variable	Mean		Std.dev.		Median	
	2009	2010	2009	2010	2009	2010
Total emissions	13.29	13.07	1.30	1.34	13.00	12.73
Relative emissions	2.83	2.56	5.48	5.32	1.00	0.95
Total energy	15.17	15.01	2.10	2.15	14.85	14.47
Relative energy	2.82	3.09	5.34	6.11	1.00	1.00
Total assets	15.40	15.50	1.78	1.79	15.22	15.42
Return on assets	0.76	0.71	0.67	0.62	0.59	0.61

Table 2: Descriptive statistics for non-listed companies

Variable	Mean		Std.dev.		Median	
	2009	2010	2009	2010	2009	2010
Total emissions	13.51	13.04	1.40	1.46	13.32	12.70
Relative emissions	2.91	2.92	4.94	4.97	1.00	1.00
Total energy	15.54	15.11	1.77	1.82	15.06	14.69
Relative energy	3.75	3.28	7.44	6.29	1.00	1.00
Total assets	13.88	13.96	1.66	1.57	14.05	14.17
Return on assets	0.96	0.88	1.45	1.15	0.54	0.57

Table 3: Regressions on financial performance

Panel A: Public companies	Model 1	2	3	4
Intercept	0.484	0.006***	0.479	0.004***
	(.704)	(2.842)	(0.713)	(2.961)
Total emissions	0.008***			
	(2.724)			
Relative emissions		0.035**		
		(2.160)		
Total energy			0.000***	
			(3.949)	
Relative energy				0.002***
				(3.203)
Emission intensity	0.136	0.72	0.106	0.673
	(-1.510)	(-0.360)	(-1.638)	(-0.425)
Size	0.008***	0.029**	0.011**	0.019**
	(-2.759)	(-2.240)	(-1.638)	(-2.417)
F	0.015**	0.055*	0.001***	0.006***
	(3.783)	(2.666)	(6.634)	(4.604)
R^2	0.151	0.111	0.24	0.187
R^2 adjusted	0.111	0.069	0.204	0.146
N	67	67	66	63
Panel B: Private companies				
Intercept	0.000***	0.000***	0.000***	0.000***
	(5.545)	(6.274)	(4.876)	(6.371)
Total emissions	0.362			
	(-0.917)			
Relative emissions		0.23		
		(-1.209)		
Total energy			0.684	
			(0.408)	
Relative energy				0.193
				(-1.314)
Emission intensity	0.542	0.368	0.194	0.374
	(-0.613)	(-0.906)	(-1.309)	(-0.894)
Size	0.000***	0.000***	0.000***	0.000***
	(-4.722)	(-5.352)	(-5.382)	(-5.474)
F	0.000***	0.000***	0.000***	0.000***
	(8.183)	(8.263)	(7.948)	(8.356)
R^2	0.293	0.3	0.287	0.303
R^2 adjusted	0.257	0.264	0.251	0.266
N	83	81	83	81

*p<0.10; **p<0.05; ***p<0.01

Total emissions are measured as natural log of aggregate of Scope 1 and Scope 2 greenhouse gas emissions. Relative emissions are measured as individual company's total emissions relative to industry median emissions. Total energy is measured as natural log of total energy consumption in each company. Relative energy is measured as individual company's total energy consumption relative to industry median consumption. Emission intensity is measured as 1 if the company is in heavy polluting industries such as mining, materials, energy, utilities and industrials, and as 0 if otherwise. Size is measured as natural log of total assets. The sample numbers vary in each model because of different data availability in each regression.

Table 4: Regressions on carbon performance

Panel A: Public companies	Total emissions	Relative emissions	Total energy	Relative energy
Intercept	0.000***	0.001***	0.013**	0.000***
	(3.713)	(-3.392)	(2.562)	(-3.706)
ROA	0.010***	0.033**	0.003***	0.074*
	(2.614)	(2.168)	(3.021)	(1.812)
Emission intensity	0.000***	0.100*	0.000***	0.008***
	(6.388)	(1.665)	(4.712)	(2.713)
Size	0.000***	0.000***	0.002***	0.000***
	(5.718)	(3.712)	(3.290)	(3.965)
F	0.000***	0.002***	0.000***	0.001***
	(18.234)	(5.282)	(10.293)	(6.091)
R^2	0.428	0.178	0.3	0.207
R^2 adjusted	0.405	0.145	0.271	0.173
N	76	76	75	73
Panel B: Private companies				
Intercept	0.000***	0.653	0.000***	0.936
	(6.464)	(-0.451)	(5.096)	(0.081)
ROA	0.205	0.399	0.154	0.375
	(1.274)	(-0.848)	(1.435)	(-0.891)
Emission intensity	0.000***	0.039**	0.000***	0.059*
	(6.101)	(2.089)	(3.687)	(1.909)
Size	0.000***	0.464	0.000***	0.901
	(4.933)	(0.735)	(3.687)	(0.124)
F	0.000***	0.096*	0.000***	0.234
	(15.741)	(2.025)	(10.650)	(1.414)
R^2	0.368	0.072	0.289	0.052
R^2 adjusted	0.345	0.037	0.262	0.015
N	112	108	109	108

*p<0.10; **p<0.05; ***p<0.01

ROA is measured as total operating revenue generated relative to total assets. Total emissions are measured as natural log of aggregate of Scope 1 and Scope 2 greenhouse gas emissions. Relative emissions are measured as individual company's total emissions relative to industry median emissions. Total energy is measured as natural log of total energy consumption in each company. Relative energy is measured as individual company's total energy consumption relative to industry median consumption. Emission intensity is measured as 1 if the company is in heavy polluting industries such as mining, materials, energy, utilities and industrials, and as 0 if otherwise. Size is measured as natural log of total assets. The sample numbers vary in each model because of different data availability in each regression.