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THE LINK BETWEEN CORPORATE GOVERNANCE AND SUSTAINABILITY: EVIDENCE FROM THE OIL & GAS INDUSTRY

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ABSTRACT

This study sought to investigate the link between corporate governance and sustainability in oil and gas firms across two countries. Sustainability was conceptualized as including three firm obligations: (1) economic performance; (2) social responsiveness; and (3) environmental quality. Using archival data from 53 Australian and 65 Canadian oil and gas companies from 2004, we found that Australian firms were more socially responsive while Canadian firms demonstrated higher levels of environmental quality. Board size was a significant predictor of social responsiveness and environmental quality for Australian firms, whereas none of the corporate governance variables provided explanations for the sustainability levels of Canadian firms.

Keywords: Corporate governance, board structure, economic performance, environmental quality, information processing, social responsiveness, sustainability

INTRODUCTION

According to Bansal (2001: 48), firms who do not respond to sustainability will “almost certainly face extinction.” In line with this bold assertion, corporate sustainability is perhaps the most recent of firm imperatives argued to better align a firm’s economic mandate with broader social objectives. In the main, corporate sustainability refers to a firm’s ability to simultaneously produce economic, social, and environmental performance (Elkinton, 1997; Bansal, 2001; Wilson and Lombardi, 2001; Steurer *et al.*, 2005). There are at least three reasons for corporate sustainability’s growing popularity.

First, in recent years climate change has been overwhelmingly acknowledged as a global problem – even amongst staunch skeptics such as governments in Australia and the United States – requiring business action on environmental issues to help arrest their potential long-term negative impacts on societal welfare (Hoffman, 2005; Kolk and Pinske, 2005; Lash and Wellington, 2007). Second, reports demonstrate that investment managers around the world are increasingly factoring social and environmental performance into their analysis of companies, suggesting that economic performance is no longer the sole criterion for firm valuations (Mercer Investment Consulting, 2006). Lastly, sustainability is viewed by some scholars as the new battleground for competitive advantage, one in which firms must find a balanced approach between economic, social, and environmental strategies in order to outperform rivals (Porter and Kramer, 2006).

Given the interest in and purported significance of sustainability, an important question remains: what drives firms to try to generate performance across economic, social, and environmental dimensions? Some have suggested pressure from institutions such as governments and non-governmental organizations (NGOs) (Moon, 2004; Campbell, 2007). Others argue that employee motives drive firms to engage in social and environmental activities (Aguilera *et al.*, 2007). Still others demonstrate that firm culture is instrumental in shaping firms’ approaches towards delivering societal benefits beyond the economic sphere (Maignan *et al.*, 1999). However, according to research from management consultancy firm McKinsey and Company, institutional investors attribute as much as 40% of a firm’s value to the quality of their *corporate governance* (Monks, 2002), suggesting the importance of this institutional factor in determining firms’ ability to drive performance, economic or otherwise.

Logically, in an era of expert testimony and high profile discussions on environmental issues (Mendonca and Oppenheim, 2007; Stern, 2007) and intense debate over firms’ social responsiveness (Pralhad and Hammond, 2002; Brugmann and Prahalad, 2007), those exercising corporate governance would be expected to ascertain the requirements of myriad stakeholders in order to meet such pressing strategic challenges; they would also be expected to oversee the effective deployment of resources to enable combined economic, social, and environmental performance. Unfortunately, there is a dearth of research examining the link between corporate governance and sustainability. Commentary, meta-analysis reports, and recent research on corporate governance (e.g., Dalton *et al.*,

1998, 1999; Daily *et al.*, 2003; Kiel and Nicholson, 2003, 2006) reveals that dependent variables of interest are variations of firm financial (economic) performance. Thus, to the degree that corporate governance is an institutional factor driving sustainability, empirical studies have yet to offer any conclusive evidence.

To fill gaps in the literature, this research provides several important contributions. First, a primary interest of corporate governance research has been to test the relationship between the construct and financial performance. This paper explores relationships between corporate governance and sustainable performance, including its economic, social, and environmental dimensions. Second, according to Thomas and McDaniel (1990), the way boards are structured to process information about strategic issues limits or enhances recognition of issue stimuli, impedes the search for data, and, ultimately, affects organizational performance. We argue that addressing three major firm responsibilities places considerable information-processing demands on board members. Using the information-processing perspective (Haleblian and Finkelstein, 1993), we develop hypotheses that predict specific links between board structure variables and economic, social, and environmental performance. Third, we test our hypotheses by using a single industry in two different countries: Australia and Canada. Canada appears to be underrepresented in the literature, so our study adds to an international perspective of corporate governance. The industry studied is oil and gas. Oil and gas firms face significant social and environmental challenges, making the industry an ideal setting for this analysis. Lastly, evidence from the research is significant for management researchers and practitioners. Addressing the posited questions will allow scholars to offer relevant advice on the likely effects of various corporate governance structures on sustainability.

BACKGROUND ON SUSTAINABILITY

Sustainability focuses on meeting current needs without compromising future generations' ability to meet their own needs (WCED, 1987). Operationalized at the firm level, sustainability consists of three interlocking principles: 1) economic performance; 2) social responsiveness; and 3) environmental quality (Elkinton, 1997; Bansal, 2001; Wilson and Lombardi, 2001; Steurer *et al.*, 2005).

Economic performance

Private business is the vehicle for economic performance (Henderson, 2005). Economic prosperity results from competitive, market-based activities; namely, from the value creation activities of firms (Mizik and Jacobson, 2003). Firms create value when they provide customers with products and services they wish to buy. According to Porter (1985) and Conner (1991), firms increase value creation through innovation in products and services, lowering costs of inputs, or realizing efficiencies in scale and scope. When firms create and capture value, consumers benefit through better products and services, shareholders benefit through dividends and increases in the value of equity, employees benefit through salaries, and society benefits through higher living standards (Holliday *et al.*, 2002). However, in the process of value creation by firms, natural resource depletion, environmental

degradation, and the disruption of communities and worker welfare and health can be potential negative by-products; thus, economic performance is tied intrinsically to social responsiveness and environmental quality (Schmidheiny, 1992).

Social responsiveness

Firms are increasingly required to respond to social issues (Augilera *et al.*, 2007). Social issues are issues that are problematic to society (Mahon and Waddock, 1992). General examples include AIDS, poverty, and obesity. However, social issues can also be very specific to firms, such as working conditions, product safety, and equal rights (Dobbin and Sutton, 1998). Carroll (1979) further argues that firms have responsibilities to the communities they operate in, including volunteering and contributing money to various social or cultural enterprises. What such viewpoints suggest is that firms have responsibilities to *society*, not just shareholders. Capturing this perspective, Donaldson and Dunfee (1994, 1995, 1999) stipulate that firms are obligated to demonstrate responsible behavior to all stakeholders, whether inside or outside corporate walls, thus making social responsiveness an important dimension of sustainability (cf. Elkinton, 1997).

Environmental quality

Economic activity invariably impacts the natural environment, in ways such as decreases in biodiversity, ozone depletion, greenhouse gas emissions, waste by-products, and deforestation (Doering *et al.*, 2002). All firms have an environmental impact, ranging from lighting of office facilities to the waste and emissions generated from production processes. More specifically, scholars have identified three main areas in which firms can address environmental quality. First, firms can control pollution through responsible waste disposal (Hart, 1995; Russo and Fouts, 1997). Second, Klassen and Whybark (1999) suggest that firms can prevent pollution through the innovative use of processes and technologies in the production process. Lastly, firms can engage in product stewardship by using fewer materials in production and by disassembling for recycling or reuse at the end of the product lifecycle (Hart, 1995). If the natural environment is compromised in the present, future generations will be limited in their ability to access basic resources such as clear air and water (WCED, 1987), highlighting the importance of environmental quality in the triadic principles of sustainability.

THEORETICAL DEVELOPMENT AND HYPOTHESES

Sustainability is current one of the more hotly contested issues in the media, and at governmental and business levels. At the heart of the issue is the degree to which corporations, both large and small, have a responsibility not only to continue to produce economic prosperity, but to do so while demonstrating both social and environmental sensitivities (Elkington, 1997; Bansal, 2001; Wilson and Lombardi, 2001; Bansal and Clelland, 2004; Steurer *et al.*, 2005). As such, sustainability is emerging as part of the social context within which firms operate (Pralhad and Hammond, 2002; Brugmann and Prahalad, 2007). However, while a firm has discretion with respect to their level of response to sustainability, failure to conform to critical, institutionalized norms can threaten a firm's

legitimacy, resources and, ultimately, its existence (DiMaggio and Powell, 1983; Scott, 1987; Meyer and Rowan, 1991; Oliver, 1991). Of primary interest then is understanding if there are links between corporate governance and sustainability.

Corporate governance, information processing and sustainability

Studying how firms are structured to provide governance and oversight (i.e., board structure) is critical because it helps to understand the roles of boards and how these roles impact on organizational performance (Daily *et al.*, 2003; Finegold *et al.*, 2007). According to Henderson and Fredrickson (1996), one of the chief issues in structuring boards is to ensure adequate information processing; the effective execution of this task is critical to organizational functioning and performance. We posit that sustainability is a complex corporate imperative that places considerable information-processing demands on firms.

Sustainability is complex and multidimensional, in that firms have three obligations in society. Firms not only are expected to produce economic results, but they are also expected to simultaneously demonstrate environmental *and* social performance (Elkington, 1997; Steurer *et al.*, 2005). These obligations result in complex business decisions with major social, economic, and environmental consequences. For instance, as a signatory to the Equator Principles, the ANZ Bank is currently assessing its willingness to finance the Gunn's pulp mill development in Tasmania, based on the possible negative social and environmental consequences of the development rather than its economic viability. The ability to balance economic growth with the broader goals of environmental and social performance increases demands on information processing and is likely to create many challenges in decision making. Therefore, in the remainder of this section, dimensions of board structure posited to be associated with sustainability are identified and hypotheses about such associations are given.

Board Size. Several scholars (e.g., Yermack, 1996; Eisenberg *et al.*, 1998; Mak and Kusnadi, 2005) argue that smaller boards are more effective than larger ones. However, this perspective is offered in the context of improving firm *economic* performance and does not take into account the increased information-processing demands of sustainability. Sustainability is complex from the perspective that firms, in a sense, have three primary obligations to society: along with economic results, they also need to demonstrate social responsiveness and environmental quality (Elkington, 1997; Bansal, 2001; Wilson and Lombardi, 2001; Bansal and Clelland, 2004; Steurer *et al.*, 2005). This increases demands on information processing and decision making, as firms have to contend with multiple – and potentially conflicting – demands on firm strategies and resources. There are three ways in which larger boards are predicted to improve the ability to process information.

First, as firms increase the number of members on boards they increase the number of items that the group can absorb and recall during the decision-making process (Haleblian and Finkelstein, 1993). Logically, given the amount of information that would need to be discussed and absorbed with respect to sustainability, the expectation is that larger board size would help facilitate a response to sustainability issues. Second, a larger board would increase the number of individual judgments that

can be used to correct errors that occur during decision-making processes. According to Amason and Sapienze (1997), larger groups tend to produce more cognitive conflict. Conflict helps to open up the solutions and ensures more rigorous examination of the issues. In the case of sustainability, given broad stakeholder demands and interests across a potentially large number of issues, larger boards facilitate issue resolution in order to affect workable strategies and policies. Lastly, following group researchers (e.g., Hill, 1982; Jackson, 1992; Watson *et al.*, 1993), larger board sizes are not only expected to increase the number of potential solutions to evaluating issues of sustainability, but also to increase the range of perspectives that can be applied and considered when evaluating problems. Hence:

General Proposition 1: Board size is positively related to sustainability.

H1a: Board size is positively related to economic performance.

H1b: Board size is positively related to social responsiveness.

H1c: Board size is positively related to environmental quality.

CEO duality. Duality refers to the situation in which an executive holds both chairperson of the board and CEO roles. A common argument in favor of duality suggests that having one individual serve as both chairperson and CEO establishes unity of command and clarity in decision-making authority (Finklestein and D'Aveni, 1994; Daily and Dalton, 1997). However, with respect to the multiple issues and challenges of sustainability, firms may need to delegate authority and the division of responsibility.

By splitting the roles of chairperson of the board and CEO, firms can infuse more power and authority into their organization, and can also add a potential information conduit to the board. Thus, we make the argument that duality hinders the information-processing capacity of the board. That is, duality likely limits the breadth of key positions involved in decision making and the overall level of information-processing capacity of the firm's top strategists. By splitting the roles of chairperson of the board and CEO, a firm disperses power and authority and increases information processing. Given that sustainability requires a broad focus across economic, social, and environmental responsibilities, the expectation is that duality hinders the ability of firms to address the many complex demands of fulfilling a sustainability strategy. Therefore:

General Proposition 2: CEO duality is negatively related to sustainability.

H2a: CEO duality is negatively related to economic performance.

H2b: CEO duality is negatively related to social responsiveness.

H2c: CEO duality is negatively related to environmental quality.

Gender. Gender is one of the most debated diversity issues in politics, society in general, and at the corporate board level (Bilimoria, 2000; Fondas and Salsalos, 2000; Singh and Vinnicombe, 2004; Hillman and Cannella, 2007). There is evidence to suggest that women differ from men regarding traits, attitudes, values, and skills at problem-solving. For example, women have been found to be more orientated toward supporting and maintaining relationships than men (Hisrich and Brush,

1994; Rosener, 1995), to be strong in the areas of idea generation and innovation, and are generally to be more satisfied with their jobs than men (Rosener, 1995). Given these and other potential differences, the expectation is that there are several ways women board members offer unique perspectives to help drive sustainable performance.

First, women board members can make a valuable contribution to information processing by providing unique perspectives on strategic issues (Bryan, 1995; Westphal and Milton, 2000). According to Burke (2000), by increasing the presence of women on boards, firms can enrich board information, perspectives, debate, and decision making. Second, women are not part of the ‘old boys’ network, which Brennan and McCafferty (1997) argue allows them to be more independent with respect to evaluating information and in making strategic decisions. Third, evidence suggests that women may have a better understanding of consumer behavior, the needs of customers, and opportunities for companies in meeting those needs (Mattis, 1993; Brennan and McCafferty, 1997; Natividad, 2005). Given that customers are a key stakeholder of firms and directly relate to firms’ economic, social, and environmental responsibilities (Carroll, 1979; Clarkson, 1995), women on boards are expected to be important in driving sustainability. Fourth, women on boards can be associated with so-called ‘soft’ issues such as charity, philanthropy, and other social causes (Bilimoria and Piderit, 1994). While perhaps not part of the core economic function of firms, social issues are nonetheless critical to sustainability (Elkington, 1997). Lastly, given women’s orientation towards supporting and maintaining relationships, Biggins (1999) argues that women better represent the needs of all stakeholders, which aids in generating and sharing information in the formulation of strategy and in decisions made regarding policies of firms, including those related to sustainability. Given their roles:

General Proposition 3: Women representation on the Board is positively related to sustainability.

H3a: Women representation on the Board is positively related to economic performance.

H3b: Women representation on the Board is positively related to social responsiveness.

H3c: Women representation on the Board is positively related to environmental quality.

Insider versus outsider representation. Because of the complex information needs and the difficulties of decision making with respect to responding to multiple stakeholder needs (Mitchell *et al.*, 1997), outsider director representation is expected to help facilitate sustainable business strategies. According to Zahra *et al.* (1993), increasing the number of outside directors on boards increases the level of diversity. By increasing diversity, sensitivity levels are increased with respect to multiple stakeholder needs, which provide resources in the form of multiple perspectives that are not available with boards made up of only insiders (Bantel and Jackson, 1989). Outsider representation on boards also increases the breadth of information that can be shared and the range of perspectives that can be given. Williams and O’Reilly (1998) argue that individuals tend to interact more easily and frequently with similar individuals; thus, by having more outsiders on boards, access to more information through

external peer networks helps to avoid the tendency towards groups that think alike, or groupthink, which is often associated with boards that are comprised of only insiders (cf. Hambrick and Mason, 1984). Further, Zahra and Stanton (1988) and Wang and Dewhirst (1992) have found that outside directors recognize that shareholders are not the only actors interested in the firm, and demonstrate a high level of consciousness about the needs and expectations of multiple stakeholders. These additional stakeholders include actors such as local communities, employees, suppliers, and governmental agencies, each of whom brings demands regarding social and environmental issues. Bringing in a greater level of knowledge of multiple stakeholder needs increases information-processing and decision-making capabilities. Thus, the following is proposed:

General Proposition 4: Outside director representation on the Board is positively related to sustainability.

H4a: Outside director representation on the Board is positively related to economic performance.

H4b: Outside director representation on the Board is positively related to social responsiveness.

H4c: Outside director representation on the Board is positively related to environmental quality.

METHODOLOGY

Sample

Oil and gas accounts for over 63% of the world's primary energy needs and directly and indirectly employs millions of people around the globe (Grant, 2003). As such, the oil and gas industry is of key concern with respect to issues of sustainability (Levy and Kolk, 2002; Grant, 2003; OGP, 2006; Anderson, 2007) and is an ideal industry for investigation. With respect to this study, our sample was selected from firms listed on the Australian Stock Exchange (ASX) in the 'Energy' Global Industry Classification System (GICS) and the Toronto Stock Exchange (TSX) under the classification of 'junior oil and gas firms' and 'oil and gas producers'. We selected firms that filed an annual report in the 2004 financial year.

There were 117 companies quoted on the ASX at 28 May 2005 under the 'Energy' GICS classification. We removed 28 firms whose principal activities were not the exploration and/or production of oil and gas. We removed a further 6 firms that were investment trusts/funds. We excluded 17 more firms that had listed after 31 December 2004. An additional 13 firms were removed as they had not been listed for a consecutive period of 24 months from 1 January 2003 to 31 December 2004. We were left with a sample of 53 firms.

There were 262 companies listed on the TSX classified as junior oil and gas firms (141) or oil and gas producers (121), and that filed an annual report for the 2004 financial year. Firms operating in the oil and gas service industry were excluded as the focus of our study is on the firms that explore,

develop and produce oil and gas. We were left with 65 firms that had been listed on the TSX for a period greater than 24 months.

An underlying assumption of this study was that the annual report is firms' primary means of communicating economic (financial), social, and environmental related information to stakeholders. The annual report is often the most widely distributed document that firms make publicly available, one in which management has considerable discretion over disclosures made. Further support for the annual report is that existing studies exploring issues of sustainability focus on annual reports (e.g., Cormier *et al.*, 2005). The use of supplementary reports (e.g., CSR, environmental, sustainability) is not widespread in Australia or Canada. Therefore, we expected most economic, social, and environmental information to be disclosed within the annual report.

Dependent variables

Economic performance. To measure economic performance, we chose return on equity (ROE). ROE is a widely used measurement to ascertain firms' economic performance and has been used extensively in corporate governance studies (Dalton *et al.*, 1998, 1999). We calculated ROE by dividing the net profit/(loss) by the book value of equity for each firm. As we are examining publicly listed firms, we thought it most appropriate to use a measure of financial performance that took into account the investment of equity made by shareholders. All data for ROE were obtained from company annual reports from 2004.

Social responsiveness and Environmental quality. To measure the degree of social responsiveness and environmental quality, we used the common approach of annual report disclosure (Maignan and Ralston, 2002; Cormier *et al.*, 2005). Disclosure in annual reports for items pertaining to social and environmental categories can be scored using a weighted or unweighted approach. There is no specific consensus, either theoretical or empirical, that imply the use of one scoring approach over the other. Prior research (Marston and Shrikes, 1991) reports the use of either approach usually yields similar results. Whilst a scaled scoring system may enable a better determination of the quality of each item disclosed, we elected to rely on a dichotomous scale (one (1) if item is disclosed, otherwise zero (0)) so as to minimize subjectivity in the scoring process. Thus, the level of social and environmental disclosure (hereafter *SocScore_j* and *EnvScore_j*) was defined as the ratio of items from the disclosure index reported in the annual report of firm *j* to the total number disclosure items applicable to firm *j*. The ratio, expressed as a percentage, is arithmetically defined as follows:

$$SocScore_j / EnvScore_j = \frac{\sum_{ij} DItem_i}{\sum_{ij} ADItem_i}$$

where:

DItem_i = social and environmental disclosure index item disclosed by firm_j in its annual report

$ADItem_i$ = social and environmental disclosure index item applicable to firm $_j$ when disclosing information in its annual report

i = social and environmental disclosure index item

j = oil and gas firm.

Social responsiveness and environmental quality were measured in 2004 and were based on the work of Williams (1999). Social responsiveness consisted of three dimensions (human resources, products and customers, and community involvement) and measured 30 items. Environmental quality consisted of two dimensions (environment and energy) and measured 17 items. Appendix A gives a breakdown of the disclosure index used in this study.

Independent variables

Corporate governance. To measure board size, we calculated the total number of board members for each firm. CEO duality was measured as a dichotomous variable where the firm was scored one (1) if the CEO chairs the board, otherwise zero (0). Gender measurement was specific to women and for this variable we measured the proportion of women on boards relative to the total number of board members. Outside director representation was measured as the proportion of outside versus inside directors. All data for corporate governance were obtained from company annual reports and were assessed for the year 2004.

Control variables. Various proxy measures (such as total assets, total sales and market capitalization) have been proposed in the literature to measure firm size (Capon *et al.*, 1996). There is no overwhelming theoretical or empirical evidence supporting a single measurement of firm size. For our study we used total assets. Specifically, $LnTotalAssets_j$ was defined as the natural logarithm of total assets of firm j for the year 2004. Another control variable, firm leverage (hereafter denoted as $Leverage_j$) was measured as the ratio of total debt to the book value of total equity for firm j .

It has also been argued that firm age is a determinant of the extent of disclosure in annual reports (Cooke, 1989). We measured firm age (hereafter denoted as $LnAge_j$) as the natural logarithm of the number of years from incorporation to the year 2004. Given our analysis relates to the oil and gas industry, we needed to control for the stage of development for the sample firms. We used a dichotomous variable (henceforth denoted as $ProdStatus_j$) to classify firms as either producers or junior explorers. Firm j is scored one (1) if it is in the production phase and zero (0) if it is a junior explorer.

Finally, whilst our study focuses on a single industry, there may be country effects in our dataset. To control for any country-specific differences we defined $CCode$ such that a firm j is scored one (1) if it is incorporated in Australia and zero (0) otherwise.

Statistical tests and model specification

To test and analyse the data collected for this study we used univariate (test-of-means), correlation, and cross-sectional regression analysis. The latter test is the primary technique employed to test our hypotheses. The main regression models used are defined as follows:

$$ROE_j = \lambda_j + \beta_1 BoardSize_j + \beta_2 Duality_j + \beta_3 WomenBd_j + \beta_4 OutsideBd_j + \beta_5 LnTotalAssets_j + \beta_6 Leverage_j + \beta_7 LnAge_j + \beta_8 ProdStatus_j + \beta_9 CCode_j + \eta_j \quad \{1\}$$

$$SocScore_j = \lambda_j + \beta_1 BoardSize_j + \beta_2 Duality_j + \beta_3 WomenBd_j + \beta_4 OutsideBd_j + \beta_5 LnTotalAssets_j + \beta_6 Leverage_j + \beta_7 LnAge_j + \beta_8 ProdStatus_j + \beta_9 CCode_j + \eta_j \quad \{2\}$$

$$EnvScore_j = \lambda_j + \beta_1 BoardSize_j + \beta_2 Duality_j + \beta_3 WomenBd_j + \beta_4 OutsideBd_j + \beta_5 LnTotalAssets_j + \beta_6 Leverage_j + \beta_7 LnAge_j + \beta_8 ProdStatus_j + \beta_9 CCode_j + \eta_j \quad \{3\}$$

where:

λ_j = the coefficient on the intercept term;

β_i = the coefficients 1 thru 9 on the independent and control variables; and

η_j = the error term.

EMPIRICAL ANALYSIS AND FINDINGS

Descriptive statistics

Table 1 reports the descriptive statistics for the pooled-sample (Panel A) and two national sub-samples (Panel B – Australian oil and gas firms, and Panel C – Canadian oil and gas firms). The mean (median) financial performance for the pooled sample was -6.77% (-0.09%), -23.58% (-12.33%) for the Australian sub-sample and 6.93% (2.18%) for the Canadian sub-sample. Test-of-Means and Wilcoxon signed rank tests comparing the mean ROE between the Australian and Canadian sub-samples indicated significant difference at conventional levels (1%). This suggests that Canadian companies were outperforming their Australian counterparts.

The mean (median) level of social disclosure for the pooled sample was 5.23% (3.33%), 7.86% (6.67%) for the Australian sub-sample and 3.08% (3.33%) for the Canadian sub-sample. Based on Student *t*-tests and Wilcoxon Z-scores the means for the pooled- and sub-samples was significantly different from zero. Test-of-Means and Wilcoxon signed rank tests comparing the mean social disclosure between the Australian and Canadian sub-samples indicated disclosure of Australian oil and gas firms was significantly higher at conventional levels (1%).

The mean (median) level of environmental disclosure for the pooled sample was 8.77% (5.88%), 5.33% (0.00%) for the Australian sub-sample and 11.58% (11.76%) for the Canadian sub-sample. Based on Student *t*-tests and Wilcoxon Z-scores the means for the pooled- and sub-samples was significantly different from zero. Test-of-Means and Wilcoxon signed rank tests comparing the mean environmental disclosure between the Australian and Canadian sub-samples indicated disclosure of Canadian oil and gas firms was significantly higher at conventional levels (1%).

Descriptive statistics for the independent and control variables report several interesting observations. The mean board size in the pooled-sample was 5.11 members. Australian boards had on average 4.49 members while Canadian boards had 5.62 members. The difference in the number of board members in the Australian and Canadian sub-samples

Variables	Panel A: Pooled Sample			Panel B: Australian Sub-Sample			Panel C: Canadian Sub-Sample		
	Mean	Std Dev.	Median	Mean	Std Dev.	Median	Mean	Std Dev.	Median
<i>ROE_j</i>	-6.77%	57.33%	-0.09%	-23.58% [†]	63.43%	-12.33%	6.93%	48.12%	2.18%
<i>SocScore_j</i>	5.23% [‡]	7.21%	3.33%	7.86% [†]	9.54%	6.67%	3.08%	3.24%	3.33%
<i>EnvScore_j</i>	8.77% [‡]	8.24%	5.88%	5.33% [†]	8.01%	0.00%	11.58%	7.35%	11.76%
<i>BoardSize_j</i>	5.11	1.69	5.00	4.49	1.71	4.00	5.62	1.71	5.00
<i>Duality_j</i>	21.19%			24.53%			18.46%		
<i>WomenBd_j</i>	1.62%	6.05%	0.00%	2.58% [†]	8.13%	0.00%	0.84%	3.44%	0.00%
<i>OutsideBd_j</i>	69.79%	16.44%	71.43%	70.99%	17.95%	66.67%	68.81%	15.17%	71.43%
<i>TotalAssets_j</i>	\$412,072,755	\$1,784,031,639	\$29,264,168	\$367,295,898	\$1,219,191,251	\$15,314,627	\$448,583,114	\$2,146,570,052	\$38,177,187
<i>Leverage_j</i>	17.34%	35.70%	2.30%	11.20%	20.85%	0.00%	22.34%	43.82%	13.14%
<i>LnAge_j</i>	8.11	0.90	8.06	8.27	0.90	8.30	7.97	0.88	8.00
<i>ProdStatus_j</i>	55.08%			62.26%			49.23%		
<i>CCode_j</i>	44.92%								

† - Comparison of means (based on Tests-of-Means and Wilcoxon signed rank tests) between the Australian and Canadian sub-samples indicates significant differences between the means at the 1% significance level.

‡ - Student *t*-tests and Wilcoxon Z-scores calculated for the means indicate significance differences from zero at the 1% significance level.

Table 1: Descriptive statistics for pooled-sample and national sub-samples

was not statistically significant. On average, 21.19% of the firms analysed had the same individual occupying the role of the CEO and Chairman; 24.53% (18.46%) of Australian (Canadian) firms exhibit CEO duality. Women representation on boards was very low, with the pooled sample having only 1.62% of the board represented by women. Australian firms had a significantly higher number of women on the board (2.58%) compared to Canadian boards (0.84%). Notwithstanding the significant difference, women representation on boards of oil and gas firms was low compared to other industries (EOWA, 2006). The average outside board representation was 69.79% for the pooled-sample, 70.99%, and 68.81% for the Australian and Canadian sub-sample respectively. The average size of all firms (proxied by the book value of total assets) was \$412,072,755¹, with the average Australian (Canadian) firm size being \$367,295,898 (\$448,583,114). The mean level of leverage for the pooled sample was 17.34%, with Australian (Canadian) firms geared by 11.20% (22.34%). The average age of the firms sampled was 8.11 years. Australian and Canadian firms were similar in age – an average of 8.27 and 7.97 years respectively. 62.26% of the Australian firms were producers (49.23% of the Canadian firms were producers).

Correlation matrix analysis

Table 2 presents a correlation matrix with the upper half reporting Pearson pairwise correlation coefficients (cr_p), the lower half Spearman correlation coefficients (cr_s). ROE_j is positively and significantly correlated with: a) $EnvScore_j$ ($p < 0.01$, cr_p and cr_s); b) $BoardSize_j$ ($p < 0.05$, cr_s); c) $WomenBd_j$ ($p < 0.05$, cr_s); d) $LnTotalAssets_j$ ($p < 0.05$, cr_p and $p < 0.01$, cr_s); e) $Leverage_j$ ($p < 0.05$, cr_s); f) $LnAge_j$ ($p < 0.05$, cr_p and cr_s), and g) $ProdStatus_j$ ($p < 0.05$, cr_p and $p < 0.01$, cr_s). ROE_j is negatively and significantly correlated with: a) $Leverage_j$ ($p < 0.05$, cr_s) and b) $CCode_j$ ($p < 0.01$, cr_p and cr_s). The results suggested that firms that performed better financially were more likely to demonstrate environmental quality, had more members on the board, had more women represented on the board, and were larger sized firms.

$SocScore_j$ is positively and significantly correlated with a) $EnvScore_j$ ($p < 0.01$, cr_p and cr_s); b) $BoardSize_j$ ($p < 0.01$, cr_p); c) $WomenBd_j$ ($p < 0.05$, cr_p and $p < 0.01$, cr_s); d) $LnTotalAssets_j$ ($p < 0.01$, cr_p and cr_s); e) $LnAge_j$ ($p < 0.01$, cr_p); f) $ProdStatus_j$ ($p < 0.05$, cr_p and $p < 0.01$, cr_s); and g) $CCode_j$ ($p < 0.01$, cr_p and cr_s). These results indicated that firms that were socially responsive and demonstrated environmental quality had more board members, more women on the board, and were larger firms. Overall results suggested that oil and gas *producers* exhibited better economic performance and social responsiveness. As firms evolve from junior explorers into producers, they start making profits but are also likely under greater scrutiny to play a more active role in society.

$EnvScore_j$ is positively and significantly correlated with: a) $BoardSize_j$ ($p < 0.01$, cr_p and cr_s); b) $WomenBd_j$ ($p < 0.05$, cr_s); c) $LnTotalAssets_j$ ($p < 0.01$, cr_p and cr_s); d) $Leverage_j$

($p < 0.01$, cr_p and cr_s); and e) $LnAge_j$ ($p < 0.05$, cr_p). $EnvScore_j$ is negatively and significantly correlated with $CCode_j$ ($p < 0.01$, cr_p and cr_s). The results suggested that as firms grow and have larger

boards, they are likely better positioned to meet the increased information- processing demands that sustainability requires. The presence of women on the board also appeared to be associated with better financial performance and greater social responsiveness and environmental quality, suggesting that women might play a positive role in meeting the information-processing demands brought about by sustainability.

Between the independent and control variables a number of significant correlations are noted. The highest Pearson (Spearman) correlation is 0.62 (0.55) between *BoardSize_{it}* and *LnTotalAssets_{it}* ($p < 0.01$, cr_p and cr_s). The maximum cr_p and cr_s values are below critical levels (i.e., 0.8; see Hair *et al.*, 1995) for multicollinearity to be a serious concern in the

Variables	ROE_j	$SocScore_j$	$EnvScore_j$	$BoardSize_j$	$Duality_j$	$WomenBd_j$	$OutsideBd_j$	$LnTotalAssets_j$	$Leverage_j$	$LnAge_j$	$ProdStatus_j$	$CCode_j$
ROE_j		0.05	0.23**	0.10	-0.01	0.06	-0.06	0.23*	-0.25**	0.22*	0.21*	-0.27**
$SocScore_j$	0.14		0.49**	0.38**	-0.14	0.21*	0.14	0.52**	0.06	0.27**	0.23*	0.33**
$EnvScore_j$	0.43**	0.36**		0.60**	-0.17	0.08	0.10	0.58**	0.29**	0.19*	0.11	-0.38**
$BoardSize_j$	0.20*	0.16	0.56**		-0.24**	0.02	0.28**	0.62**	0.29**	0.11	0.09	-0.33**
$Duality_j$	-0.12	-0.11	-0.16	-0.24**		-0.03	-0.31**	-0.26**	-0.10	0.09	-0.03	0.07
$WomenBd_j$	0.18*	0.25**	0.19*	0.14	-0.08		-0.03	0.12	0.07	0.21*	-0.04	0.14
$OutsideBd_j$	0.07	0.08	0.12	0.30**	-0.31**	0.10		0.23*	-0.01	0.08	0.07	0.07
$LnTotalAssets_j$	0.56**	0.30**	0.53**	0.55**	-0.27**	0.16	0.29**		0.38**	0.15	0.37**	-0.16
$Leverage_j$	0.21*	0.05	0.31**	0.27**	-0.26**	0.22*	0.06	0.40**		-0.02	-0.01	-0.16
$LnAge_j$	0.20*	0.15	0.06	0.04	0.07	0.25**	0.07	0.06	-0.10		0.28**	0.16
$ProdStatus_j$	0.25**	0.23**	0.05	0.07	-0.03	0.02	0.08	0.38**	0.03	0.27**		0.13
$CCode_j$	-0.30**	0.34**	-0.47**	-0.38	0.07	0.10	0.03	-0.24**	-0.23*	0.16	0.13	

* $p < 0.05$ (two-tailed).

** $p < 0.01$ (two-tailed).

Table 2: Pearson and Spearman correlation matrix

cross-sectional regression analysis. Variance inflation factor (VIF) scores also indicated no serious problems with multicollinearity.²

Cross-sectional regression findings

Table 3 reports cross-sectional regression findings based on Equation 1, 2, and 3 for the pooled sample. For Equation 1 (Table 4 Panel A) the coefficients on $LnTotalAssets_j$ ($p < 0.01$) and $LnAge_j$ ($p < 0.05$) are positively and significantly associated with ROE_j . These findings are consistent with theoretical and empirical expectations, plus prior reported correlation findings (see Table 3). Larger and more established firms tend to perform better financially than smaller, younger firms. Meanwhile, there is a statistically significant negative association between $Leverage_j$ ($p < 0.01$) and $CCode_j$ ($p < 0.01$) and ROE_j . The negative $Leverage_j$ and ROE_j association implies that highly leveraged firms exhibit poor financial performance. Coefficients on all remaining independent and control variables were not significant.

<i>Variables</i>	Panel A: ROE		Panel B: Social		Panel C: Environmental	
	β	<i>t</i> -statistic	β	<i>t</i> -statistic	β	<i>t</i> -statistic
<i>Constant</i>	-2.24	-3.41***	-37.89	-5.45***	-31.83	-3.87***
<i>BoardSize_j</i>	-0.13	-1.21	0.30	3.20***	0.29	3.03***
<i>Duality_j</i>	-0.01	-0.06	-0.03	-0.41	-0.02	-0.24
<i>WomenBd_j</i>	0.06	0.74	0.06	0.91	0.03	0.35
<i>OutsideBd_j</i>	-0.11	-1.22	-0.10	-1.38	-0.06	-0.76
<i>LnTotalAssets_j</i>	0.36	3.02***	0.48	4.81***	0.35	3.41***
<i>Leverage_j</i>	-0.40	-4.65***	-0.13	-1.84 [†]	0.03	0.42
<i>LnAge_j</i>	0.21	2.38**	0.10	1.39	0.16	2.07**
<i>ProdStatus_j</i>	0.09	0.99	-0.06	-0.73	-0.05	-0.67
<i>CCode_j</i>	-0.36	-4.13***	0.48	6.43**	-0.24	-3.12***
Summary						
R ²	0.28		0.49		0.46	
F	6.14***		13.53***		11.89***	
N	118		118		118	

[†] $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

Table 3: Cross-sectional regression analysis of pooled sample

Results for Equation 2 (Table 4 Panel B) indicate the coefficients on $BoardSize_j$

($p < 0.01$), $LnTotalAssets_j$ ($p < 0.01$) and $CCode_j$ ($p < 0.01$) are positive and significantly associated with $SocScore_j$. There is a moderately significant negative relationship between $Leverage_j$ and $SocScore_j$ ($p < 0.10$). Results for Equation 3 (Table 4 Panel C) reveal that coefficients on $BoardSize_j$ ($p < 0.01$), $LnTotalAssets_j$ ($p < 0.01$) and $LnAge_j$ ($p < 0.05$) are positively and significantly associated with $EnvScore_j$. Contrary to results in Panel B, there is a significant negative association between $CCode_j$ and $EnvScore_j$ ($p < 0.01$). Results in Panels B and C suggest that larger boards are more likely able to meet the information-processing demands of sustainability in order to adequately address and even enhance their social responsiveness and environmental quality. These results provide support for $H1b$ and $H1c$. Firms that are responsive to sustainability also tend to be larger firms that have the resources to commit to social and environmental activities.

The overall results suggested that there were significant differences between Australian and Canadian firms regarding what determines their economic performance and social responsiveness and environmental quality. Given the apparent strength of Country as a determinant of economic performance, social responsiveness, and environmental quality, we decided to conduct additional partitioning analysis. We conducted this partitioning analysis in part as robustness checks for the main findings, but also to determine if non-significant factors identified in the main results are of any explanatory value, albeit masked by the dominance of prominent features such as Country. Thus, we partitioned the pooled-sample according to Australian and Canadian firms. Cross-sectional regression analysis based on Equations 1, 2, and 3 was then performed again with results reported in Tables 4 and 5.

For the Australian sub-sample, there is a significant positive association between $BoardSize_j$ and both $SocScore_j$ and $EnvScore_j$ ($p < 0.01$). $LnTotalAssets_j$ has a moderately significant relationship with ROE_j , $SocScore_j$ and $EnvScore_j$. $Leverage_j$ has a moderately significant positive association with $EnvScore_j$. The results for the Australian sub-sample provided support for $H1b$ and $H1c$. Larger boards in Australian oil and gas firms appeared to facilitate information processing and decision making on sustainability, ensuring that social responsiveness and environmental quality was enhanced.

<i>Variables</i>	Panel A: ROE		Panel B: Social		Panel C: Environmental	
	Model 1		Model 2		Model 3	
	β	<i>t</i> -statistic	β	<i>t</i> -statistic	β	<i>t</i> -statistic
<i>Constant</i>	-3.46	-2.96***	-36.60	-2.95***	-30.93	-3.20***
<i>BoardSize_j</i>	-0.18	-0.80	0.52	3.28***	0.50	3.42***
<i>Duality_j</i>	0.08	0.56	-0.04	-0.37	0.05	0.48
<i>WomenBd_j</i>	0.08	0.53	0.08	0.73	-0.05	-0.47
<i>OutsideBd_j</i>	-0.05	-0.31	-0.14	-1.37	-0.10	-0.99
<i>LnTotalAssets_j</i>	0.52	2.04**	0.36	1.99 [†]	0.37	2.22**

<i>Leverage_j</i>	-0.10	-0.74	-0.02	-0.19	0.24	2.59**
<i>LnAge_j</i>	0.16	0.97	0.13	1.11	0.08	0.77
<i>ProdStatus_j</i>	0.08	0.48	-0.12	-0.96	-0.21	-1.81 [†]
Summary						
R ²	0.18		0.59		0.65	
F	2.43**		10.48***		13.04***	
N	53		53		53	

[†] $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

Table 4: Cross-sectional regression analysis of Australian sub-sample

The results from the Canadian sub-sample did not support any of the hypotheses. *Leverage_j* was the only statistically significant predictor of *ROE_j*. *LnTotalAssets_j* was the only predictor of *SocScore_j* ($p < 0.01$). *LnTotalAssets_j* and *LnAge_j* were moderate predictors of *EnvScore_j* ($p < 0.05$). Whilst these findings do not support our hypotheses, they are consistent with prior research – larger and more established firms tend to be more responsive to social and environmental issues (e.g., Maignan and Ralston, 2002; Cormier *et al.*, 2005).

<i>Variables</i>	Panel A: ROE Model 1		Panel B: Social Model 2		Panel C: Environmental Model 3	
	β	<i>t-statistic</i>	β	<i>t-statistic</i>	β	<i>t-statistic</i>
<i>Constant</i>	-1.01	-1.17	-17.85	-2.89***	-35.29	-2.57**
<i>BoardSize_j</i>	-0.15	-1.17	-0.03	-0.19	0.10	0.72
<i>Duality_j</i>	-0.09	-0.77	0.04	0.34	0.01	0.01
<i>WomenBd_j</i>	-0.01	-0.13	0.10	0.84	0.14	1.15
<i>OutsideBd_j</i>	-0.07	-0.53	0.07	0.54	-0.06	-0.44
<i>LnTotalAssets_j</i>	0.17	1.10	0.50	3.14***	0.36	2.26**
<i>Leverage_j</i>	-0.56	-4.48***	-0.11	-0.80	0.01	0.06
<i>LnAge_j</i>	0.18	1.62	0.12	1.03	0.28	2.42**
<i>ProdStatus_j</i>	0.10	0.84	-0.02	-0.15	0.05	0.39
Summary						
R ²	0.27		0.17		0.20	
F	3.88***		2.58**		2.97***	
N	65		65		65	

[†] $p < 0.10$

** $p < 0.05$

*** $p < 0.01$

Table 5: Cross-sectional regression analysis of Canadian sub-sample

DISCUSSION AND CONCLUSION

A primary objective of our study is to further the present understanding of the role of corporate governance in enhancing economic performance, social responsiveness, and environmental quality. A significant contribution of our study is that it diverges from prior research in several ways. First, our study is one of the first to investigate corporate governance and sustainability in the oil and gas industry across an international setting. We focus on the oil and gas industry, not only because of its current significance to global development, but due to growing recognition by major oil and gas firms of a need to better develop sustainable practices (as evidenced by major advertising campaigns, for example). This study also makes a contribution in that we examine the disclosure practices of two nations who are at the forefront of oil and gas exploration, development, and production. We focus on these two nations, not only because the oil and gas industry are key sectors in each nation's economy, but for their similar socio-political environments, economic infrastructures, and accounting regulatory frameworks – plus close historical and economic ties. These similarities and ties assist to reduce noise in the analysis, making comparison across national boundaries more meaningful.

Taking our empirical results overall, we conclude there is support for *H1b* and *H1c* for the pooled-sample and for the Australian sub-sample. Therefore, evidence suggests that board size plays a significant role in the level of social responsiveness and environmental quality of Australian firms compared to Canadian firms. In Australia, we posit that larger boards tend to be more diligent in terms of discussing and responding to social and environmental responsibilities, whereas firms in Canada seem to be able to fulfil their duties without the additional resources available to larger boards. This is possibly driven by tighter regulation in North America over firms' social and environmental obligations or by heightened institutional pressures to demonstrate socially responsible business practices. In Australia, it appears that firms will only enhance their responsiveness if they have the additional resources of a larger board to effectively meet the information-processing demands of sustainability. That is, in Australia, larger boards are likely more productive in recognizing issues, processing large amounts of information, and making necessary decisions about their social responsiveness and environmental quality.

In the main regression analysis, with respect to other predictor variables, we did not find statistical significance between CEO duality, women representation on boards and outside representation on boards and sustainability. An apparent explanation for no statistically significant finding between women representation on boards and sustainability is that there simply are very few women on boards in this sample. For example, in Australia, women represent only 2.58% of board composition, while in Canada they represent only 0.84%. Where a 'critical mass' of women on boards is not reached, their ability to have an impact on information processing and decision making is diminished (Rosener, 1995). As for CEO duality, one explanation might be that because many firms in the sample are generating losses and are highly leveraged, having one individual serve as both chairperson and CEO establishes unity of command and clarity in decision-making authority as firms struggle to make a profit. Splitting CEO and chairperson roles, in this sample, might have caused a distraction from strong focus on economic responsibilities. As for outside director representation, we did find the expected association. That is, the association between outside director representation and sustainability was negative across economic performance, social responsiveness, and environmental quality. However, the coefficients were not significant and therefore we could not accept our hypotheses.

As for future research, our results present various options for further empirical research in corporate governance and sustainability. One particularly important avenue would be to investigate the characteristics of board members and how these may impact the firms' willingness to improve their social and environmental standing. Qualifications, age, and social capital may be potential determinants of sustainability efforts within oil and gas firms. Additionally, our research needs to be further explored across multiple countries and industries to determine the extent to which corporate governance is linked to sustainability beyond a limited domain.

NOTES

1. All amounts are denominated in Australian Dollars.
2. The highest calculated VIF is 3.81. As VIFs in excess of ten are deemed to be evidence of serious multicollinearity (Hair *et al.*, 1995) standard interpretations of the regression coefficients presented in the tables can be made. Other diagnostics (eigenvalues and condition values) further suggest that multicollinearity is not a significant problem.

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Appendix A – Disclosure index for oil & gas companies

Category of Environmental and Social Disclosure

A.1 Environment (Environmental Quality)

- A.1.1 General environmental considerations
- A.1.2 Environmental policy
- A.1.3 Environmental audit
- A.1.4 Environmental – product and process-related
- A.1.5 Environmental financially related data
- A.1.6 Sustainability
- A.1.7 Environmental aesthetics

A.2 Energy (Environmental Quality)

- A.2.1 Conservation of energy in the conduct of business operations
- A.2.2 Using energy efficiently
- A.2.3 Utilizing waste materials for energy production
- A.2.4 Disclosing energy savings through recycling
- A.2.5 Discussing the company effort to reduce energy consumption
- A.2.6 Disclosing increased energy efficiency of products
- A.2.7 Research aimed at improving energy efficiency of products
- A.2.8 Receiving an award for an energy conservation programme
- A.2.9 Voicing company's concern about the energy shortage
- A.2.10 Disclosing the company's energy policies

A.3 Human Resources (Social Responsiveness)

- A.3.1 Health and safety
- A.3.2 Employees appreciation
- A.3.3 Equal employment policy
- A.3.4 University graduate recruitment information
- A.3.5 Breakdown of employees by line of business
- A.3.6 Breakdown of employees by geographic area
- A.3.7 Number of employees – full time and part time
- A.3.8 Categories of employees by gender
- A.3.9 Corporate policy on employee training
- A.3.10 Amount spent on training
- A.3.11 Employees by minority
- A.3.12 Number of employees trained

- A.3.13 Cost of safety measures
- A.3.14 No. of accidents
- A.3.15 Discussion of employee welfare
- A.3.16 General redundancy information
- A.3.17 Human resources training initiatives

A.4 Products and Customers (Social Responsiveness)

- A.4.1 Product development
- A.4.2 Product safety
- A.4.3 Product quality
- A.4.4 Customer information

A.5 Community Involvement (Social Responsiveness)

- A.5.1 Donations for community activities
- A.5.2 Summer or part time employment of students
- A.5.3 Sponsoring of public health, sporting or recreational projects
- A.5.4 Aiding medical research
- A.5.5 Sponsoring educational conferences, seminars or art exhibitions
- A.5.6 Funding scholarship programmes or activities
- A.5.7 Supporting national pride/government sponsored campaigns
- A.5.8 Sponsoring community self-help activities
- A.5.9 Supporting the development of local industries or community programmes and activities