

Social and Environmental Disclosure of Australian and Canadian Oil and Gas Firms: An Information Costs Perspective

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Abstract

Using an information economics framework and a 47-item disclosure index, two determinants (proceeds from share issue and trading volume of shares during the fiscal year) of social and environmental disclosure of 53 Australian and 48 Canadian oil and gas firms were empirically examined. Results indicated that only one information cost proxy (proceeds from share issue) is a significant determinant of the extent of social and environmental disclosure amongst the sample. However, the directional sign of proceeds from share issue was contrary to expectations. Results indicate that firm size is the dominant factor determining the extent of social and environmental disclosure practices in the oil and gas industry. Whilst the empirical findings may not provide overwhelming support for the predicted outcomes, the study is a starting point for exploring alternative theoretical models to explain the type and extent of social and environmental disclosure.

Introduction

In recent years, the oil and gas industry has seen a surge in activity driven by rising commodity prices. With many existing oil and gas fields maturing and making new energy discoveries increasingly difficult, there are growing energy supply pressures. There is a growing realisation amongst corporate executives, scholars and practitioners alike that solutions to the impending energy crisis must be built on principles of sustainability that are synonymous with social and environmental accounting. This realisation is evidenced by the change in advertising slogans being adopted by major oil and gas firms worldwide such as Shell, Chevron and BP.

The oil and gas sectors in Australia and Canada represent a significant revenue base for each respective economy. Oil and gas firms rely on the equity markets to raise capital to fund future growth. This represents a significant opportunity to explore the association between the reliance of firms on the equity market and the extent of social and environmental disclosure made in order to reduce the information asymmetry that exists

between firms and potential investors. This study also seeks to extend current methodological norms as they exist in social and environmental disclosure research by examining the determinants of social and environmental disclosure using the information costs hypothesis.

The study examines the level of social and environmental disclosure in annual reports of 53 Australian and 48 Canadian oil and gas firms for the 2004 financial year. Two likely determinants of social and environmental disclosure are identified: proceeds from share issue and trading volume of shares quoted on the relevant exchange.

This paper comprises five sections. The following section provides a brief synopsis of the literature on social and environmental disclosure, the next section outlines the research methodology employed in this paper while the fourth section provides a discussion of the empirical results. The final section provides the conclusion and discussion of future research.

Background and Literature Review

Disclosure Practices of Listed Companies under a Cost/Benefit Framework

The focus of this study is on voluntary¹ disclosure of social and environmental information in annual reports of oil and gas firms. Corporate disclosure is important for the functioning of an efficient capital market. Foster (1986) argues that firms compete in capital markets for investment capital to fund their operations. Uncertainty exists in capital markets about the quality of oil and gas firms in terms of the nature of their assets and the riskiness of their cash flows. Oil and gas firms will supply voluntary information to the extent that the benefits from doing so outweigh the potential costs.

Healy and Palepu (2001) argue that demand for financial reporting and disclosure arises from information asymmetry and agency conflicts between managers and outside investors. The information or 'lemons' problem introduced by Akerlof (1970) results from information differences and conflicting incentives between managers and investors. Managers of oil and gas firms possess private information about the quality of each exploration permit or lease. Investors will value both 'good' leases and 'bad' leases at an average level. Managers therefore have an incentive to make voluntary disclosures about the quality of their projects to alleviate the information problem.

Research on voluntary disclosure focuses on the information role of financial reporting for capital markets (Healy & Palepu, 1993, 1995). There is an implied assumption in disclosure studies that managers have superior information to outside investors. Verrecchia (1983) supports the view that there is a threshold for disclosure.

It is argued that investors' perceptions of firms issuing equity or public debt are important to corporate managers who have superior information to these outside investors regarding the future prospects of the firm (Healy & Palepu, 1993, 1995). Myers and Majluf (1984) posit that issuance of equity or debt will be costly to existing shareholders if the information asymmetry cannot be resolved. Hence, firms entering into capital market transactions have the incentive to provide voluntary disclosure to reduce the information asymmetry issue. This will in turn reduce the firm's external cost of financing (Botosan,

1997). Barry and Brown (1985) and Merton (1987) come to a similar conclusion. Corporate managers are able to reduce their cost of capital by reducing the information risk borne by investors through increased voluntary disclosure.

Prior research provides evidence on voluntary disclosure practices of firms issuing new capital. Lang and Lundholm (1993) report disclosures by firms issuing securities in the current or future periods are rated more highly by analysts. In a subsequent paper, focusing solely on firms making equity offerings, Lang and Lundholm (2000) document a significant increase in disclosure beginning six months prior to the equity offering.

The willingness of firms to voluntarily disclose information to investors is influenced by concerns that such disclosures can compromise their competitive position in product markets (Verrecchia, 1983; Darrough & Stoughton, 1990). The existence of proprietary costs implies that firms have an incentive not to disclose information that will reduce their competitive position even if their cost of capital is increased as a result. The incentive not to disclose information would be sensitive to the type of information to be disclosed as well as the nature of the competition. By incurring costs that result from disclosure of proprietary information, a firm enhances the credibility of information being released and improves the reputation as a high quality discloser (Skinner, 1994).

The focus of this study is on the aspect of information costs relating to accessing the capital market via a share issue and the information costs borne by investors trading the stock of the firm (proxied by trading volume).

Social and Environmental Research

Social and environmental research has a lengthy history. Maignan and Van Velthoven (2005), however, argue that despite extensive interest and efforts in this field of investigation, a comprehensive theoretical framework of the underlying determinants of social and environmental disclosure remains elusive. Gray, Kouhy and Lavers (1995) argue that empirical studies have relied on various theoretical constructs which has impeded the formulation of a unifying theoretical framework.

Cormier *et al.* (2005) proposed a multi-dimensional theoretical framework to examine social and environmental disclosure in large German firms. Part of this multi-dimensional approach includes information costs as a determinant of social and environmental disclosure. Whilst a multi-dimensional framework has been proposed within the social and environmental extant literature, this study adopts a narrow focus with a concentration on the information cost perspective. Two reasons support adoption of a single theoretical focus. First, as the study seeks to consider a confined set of determinants, the narrower lens of observations minimises the possible impeding noise of overlapping theoretical notions when using a multi-dimensional framework. Second, the study concentrates on an industry continually accessing capital markets to fund future growth and development and, therefore, to which information costs are highly applicable.

Firms that continually rely on the capital markets for funding must be aware of issues relating to information asymmetry. Management has a responsibility to ensure that cost of capital is minimised via the strategic use of voluntary disclosure (Richardson & Welker,

2001). Ongoing disclosure and communication with investors should reduce information asymmetry between managers and investors and will also reduce the information costs incurred by investors (Kim & Verrecchia, 1994).

This study seeks to build on prior literature by testing the association between two determinants drawn from the information cost hypothesis. Hypotheses related to the two determinants are developed in the following section.

Hypothesis Development

Information Costs

Grossman (1981) and Milgrom (1981) posit that there is an information gap between investors and corporate managers. Investors, at their own cost, can choose to collect and analyse data about the firm if managers do not provide credible information. Taking a societal view, non-disclosure may be deemed to be inefficient as it leads to numerous investors simultaneously collecting and analysing the same firm data (Rubenstein, 2001). Therefore, under certain conditions, a firm may decide to voluntarily disclose information if doing so is less costly than having investors and other market participants individually incurring information costs (Atiase, 1985; Lang & Lundholm, 1993). Firms continually seeking access to capital markets have incentives to reduce information asymmetry between managers and investors as such actions lower the cost of raising capital (Frankel, McNichols & Wilson, 1995; Gibbins, Richardson & Waterhouse, 1990). Firms with a higher level of systematic risk also have an incentive to provide additional disclosure. Based on the above discussion, the following general hypotheses associated with information costs were developed:

General Hypothesis 1

There is a positive association between the level of social and environmental disclosure for oil and gas firms and the size of the proceeds from share issues.

General Hypothesis 2

There is a positive association between the level of social and environmental disclosure and the annual turnover of shares in oil and gas firms.

Research Method

This section outlines the methodological approach used in the study. The first subsection describes the data and how the sample was drawn. The next subsection outlines the technique used for the analysis of the data, including a discussion of the disclosure index. The final subsection reports on the regression model used and provides an explanation of its variables and measures.

Population and Sample Selection

The study sample was selected from firms listed on the Australian Stock Exchange (ASX) in the 'Energy' GICS classification and the Toronto Stock Exchange (TSX) under

the classification of 'junior oil and gas firms' and 'oil and gas producers'. Firms that filed an annual report in the 2004 financial year were then selected.

There were 117 companies quoted on the ASX at 28 May 2005 under the *Energy GICS* classification. Twenty-eight firms whose principal activities were not the exploration and/or production of oil and gas were removed. A further six firms that were investment trusts/funds were also removed. Seventeen more firms that were listed after 31 December 2004 were excluded. An additional 13 firms were removed as they were not listed for a consecutive period of 24 months from 1 January 2003 to 31 December 2004. A sample of 53 firms remained.

There were 262 companies listed on the TSX classified as junior oil and gas firms (141) and oil and gas producers (121) 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 the study is on the firms that explore, develop and produce oil and gas. From the population that were listed on the TSX for a period greater than 24 months, 50 firms were randomly selected. Two firms were excluded as share trading volume data was unavailable.

An underlying assumption of this study is that the annual report is the firms' primary means of communicating social and environmental related information to investors. It is acknowledged that oil and gas firms have other mechanisms at their disposal to convey this information to existing and potential investors.

The annual report is often the most widely distributed document that the firms make publicly available. Furthermore, management has considerable discretion over the disclosure made in the annual report. Further support for the annual report is that existing studies in social and environmental disclosures focus on annual reports (Cormier *et al.*, 2005). The use of supplementary reports is not widespread in Australia and Canada. Therefore, most social and environmental disclosure is expected to be made within the annual report.

Measuring Social and Environmental Disclosure (Dependent Variable)

To measure the amount of social and environmental disclosure in the annual reports, each item can be scored using a weighted or unweighted approach. There is no specific consensus, either theoretical or empirical, that infers the use of one scoring approach over the other. Prior research (Marston & Shrives, 1991) reports that 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, due to the exploratory nature of the study, it was 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 *SEDScore_j*) is defined as the ratio of items from the disclosure index reported in the annual report of firm *j* to the total number of disclosure items applicable to firm *j*. The ratio, expressed as a percentage, is arithmetically defined as follows:

$$SEDScore_j = \frac{\sum_{ij} DItem_i}{\sum_{ij} ADItem_i}$$

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

Refer to Appendix A for a breakdown of the social and environmental disclosure index used in this study.

Measure of Independent Variables

Economic incentives to disclose social and environmental information are derived from the information costs hypothesis. Variables used to capture each type of cost are reviewed as follows.

Information Costs

Two variables are used to capture investors' information needs and information costs with respect to the firm's social and environmental disclosure practices.

- Reliance on capital market (Capital markets)
- Trading volume (Volume).

Capital Markets

Firms that regularly access capital markets will need to exhibit greater transparency in their reporting practices. Investors, bankers and analysts may react negatively to any adverse news which may jeopardise future financing opportunities (Frankel *et al.*, 1995). The natural logarithm of proceeds raised by firm j ($LN(Proceeds)_j$) from seasoned share offering during the fiscal year is used as the proxy measure for a firm's capital market reliance. Consistent with Hypothesis 1, capital markets is expected to be positively associated with the extent of social and environmental disclosure (Lang & Lundholm, 1993; Cormier & Magnan, 1999, 2003).

Volume

Scott (1994) and Cormier and Magnan (1999) argue that trading volume is a proxy for the extent of private information production generated by investors and other market

players. The higher the trading activity or stock turnover, the more the market participants have to obtain information about its activities. Additional disclosure by the firm reduces market players' need to engage in costly collection of private data. $TVolume_j$ is measured as annual trading volume (on all relevant exchanges) divided by the total number of shares outstanding. Consistent with Hypothesis 2, a positive association is expected between trading volume and the extent of the environmental disclosure.

Control Variable Measures

Various proxy measures (such as total assets, total sales and market capitalisation) have been proposed in the literature to measure firm size. There is no overwhelming theoretical or empirical evidence supporting a specific basis of firm size. For this study, total assets are used. Specifically, $Ln(TA)$ is defined as the natural logarithm of total assets of firm j at the end of the financial year.

Table 1: Summary Variables and their Proxy Measure Determination.

Variable Title	Variable Description
<i>Dependent</i>	
$SEDScore_j$	Ratio of the number of social and environmental items i disclosed by firm j in their annual report to the number of social and environmental items i applicable to firm j expressed as a percentage
<i>Independent</i>	
$Ln(Proceeds)_j$	Natural logarithm of the proceeds from issue of shares during the 2004 fiscal year
$TVolume_j$	Ratio of the annual trading volume of ordinary shares for firm j to the total number of shares outstanding at the end of the 2004 fiscal year
<i>Controls</i>	
$Ln(TA)_j$	Natural logarithm of the total book value of assets for firm j as at the end of its 2004 fiscal year end
$Ln(Age)_j$	Natural logarithm of the number of years from incorporation of firm j to the end of the 2004 fiscal year for firm j
$LStatus_j$	Indicator variable where firm j is scored one (1) if it is listed on its domestic stock exchange and an overseas exchange; otherwise firm j is scored zero (0)
$CCode_j$	Indicator variable where firm j is scored one (1) if it is incorporated in Australia; otherwise firm j is scored zero (0)

Source: Original table.

Another control variable, listing status (hereafter denoted as $LStatus$), is measured using a dichotomous scale where firm j is score one (1) if it is listed on the ASX or TSX and at least one other international stock exchange and zero (0) if not. It has also been

argued in the voluntary disclosure literature that firm age is a determinant of the extent of disclosure (Cooke, 1989). Firm age is measured as the natural logarithm of the number of years from incorporation to the end of the 2004 fiscal year. Finally, whilst the study focuses on a single industry, there may be country effects in the dataset. To control for any country specific differences *CCode* is defined such that a firm *j* is scored one (1) if it is incorporated in Australia and zero (0) otherwise. Table 1 provides a summary of the proxy measures used in this study for the dependent, independent and control variables.

Statistical Tests and Main Model Specification

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

$$SEDScore_j = \lambda_j + \beta_1 Ln(Proceeds)_j + \beta_2 TVolume_j + \beta_3 Ln(TA)_j + \beta_4 LStatus_j + \beta_5 Ln(Age)_j + \beta_6 CCode_j + \eta_j \quad (1)$$

Where:

Formal definitions of dependent, independent and control variables are presented in Table 1.

λ_j = the coefficient on the intercept term

β_i = the coefficients 1 thru 6 on the independent and control variables

η_j = the error term.

Empirical Findings

Descriptive Statistics

Table 2 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) level of social and environmental disclosure for the pooled sample is 6.59 percent (4.25%), 6.94 percent (4.25%) for the Australian sub-sample and 6.20 percent (6.38%) for the Canadian sub-sample. Based on Student *t*-tests and Wilcoxon Z-scores, the means for the pooled and sub-samples are significantly different from zero. Test-of-Means and Wilcoxon signed rank tests comparing the mean social and environmental disclosure between the Australian and Canadian sub-samples indicate no significant difference at conventional levels. Recent advertising campaigns by major oil and gas firms emphasise a growing awareness of sustainability issues within the oil and gas industry. Thus, the amount of social and environmental disclosure in coming years may potentially increase in line with previous studies that focus on other industries.

Further analysis of the disclosure patterns for the sample indicates that some firms did not provide any voluntary disclosures related to social and environmental items. Firms not making any voluntary social and environmental disclosures represent 15.09 percent of the Australian sub-sample (8 firms) while only 4.17 percent (2 firms) of the Canadian sub-

sample were non-disclosers. The minimum and maximum amount of IC disclosure for any one firm in the pooled sample is 0.00 percent and 36.17 percent (for the Australian sub-sample it is 0.00% and 36.17%. and for the Canadian sub-sample it is 0.00% and 21.27%).

Disclosure across the five major categories of social and environmental information for the pooled sample is highest with respect to *Environmental* issues, followed by *Human Resources* issues. In the pooled sample, 19.66 percent of all possible disclosure was made in relation to *Environmental* items (11.59% of all Australian sub-sample and 28.57% for the Canadian sub-sample), followed by 6.99 percent of all possible disclosure being made in relation to *Human Resource* items (9.21% for the Australian sub-sample and 4.53% for the Canadian sub-sample).

Disclosures related to *Energy* issues are the lowest on average for the pooled sample, with reporting of *Community Involvement* also particularly light. In the pooled sample, only 0.69 percent of all voluntary disclosure items on the disclosure index were scored for the *Energy* category (0.94% for the Australian sub-sample and 0.42% for the Canadian sub-sample). Disclosure for the category for *Community Involvement* was also quite low for the pooled sample at 2.97 percent (5.03% for the Australian sub-sample and 0.69% for the Canadian sub-sample). Disclosure patterns for the pooled sample of Australian and Canadian sub-samples respectively are similar for the remaining social and environmental disclosure categories.

Descriptive statistics for the independent and control variables report several interesting observations. First, a sizeable proportion of the sample (89.66%) accessed the capital market during their 2004 fiscal year in search of additional equity financing, raising an average amount of AUD\$16,354,758. The high number of firms making seasoned offerings could reflect budding future optimism at the time fuelled by increases in demand for oil and gas products and escalating increases in oil, gas and other natural resource commodities.² In light of such expectations, firms in the sample could have sought additional equity funding to help boost exploration and production efforts.

Second, across the continuous independent and control variables, Student *t*-tests and Wilcoxon Z-scores indicate significant differences in the means volume of shares traded. A possible explanation for these differences is the type of oil and gas firms prevalent in Australia and Canada. Nearly 38 percent of Australian oil and gas firms in the sample are classified as 'explorers', whereas, it is slightly under five percent for Canada. Typically, oil and gas firms focused on exploration are likely to be speculative investments. The researchers would expect to observe a lighter turnover in more speculative shares.

Third, the mean age of the pooled samples is 13.77 years (14.74% for the Australian sub-sample and 12.71% for the Canadian sub-sample). The means of firm age are not significantly different.

Fourth, the mean number of firms in the pooled sample that are listed on a foreign stock exchange (in addition to their home listing) is 16.83 percent. In the Australian sub-sample 25.00 percent of firms are multi-listed, whereas the mean for Canadian firms is much lower at 8.00 percent. This could be explained by the fact that Australia has a smaller capital market to that of North America (USA and Canada). Australian oil and gas firms

list on overseas exchanges to gain access to the wider group of investors. This could also be driving the significant difference in means of trading volume of shares. This measure incorporates securities traded on all exchanges that firm_j is listed on.

Table 2: Descriptive Statistics for Pooled-Sample and National 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
$SEDScore_j$	6.594‡	6.989	4.255	6.945‡	8.634	4.255	6.206‡	4.599	6.382
$SIProceeds_j$	16,354,758	40,897,505	3,042,400	16,018,062	45,695,749	2,500,000	16,726,526	35,330,257	4,107,861
$TVolume_j$	67.788	60.077	47.884	86.451	65.109	75.036	47.184†	46.519	34.296
$Ln(TA)_j$	17.268	2.112	17.077	16.902	2.102	16.544	17.672	2.069	17.517
Age_j	13.772	10.518	10.000	14.736	11.358	11.000	12.709	9.510	9.351
$LStatus_j$	16.832			24.528			8.333		
$CCode_j$	52.475								

Source: Original table.

Note: † - 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; ζ_j - $SIProceeds_j$ is the amount of proceeds raised by firm_j from any seasoned share issues during the fiscal year (amount expressed in AUD\$); and see Table 1 for definitions of variables.

Correlation Matrix Analysis

Table 3 presents a correlation matrix with the upper half reporting Pearson pairwise correlation coefficients (cr_p) and the lower half Spearman correlation coefficients (cr_s). $SEDScore_j$ is positively significantly correlated with: (a) $TVolume_j$ ($p < 0.01$, cr_p); (b) $Ln(TA)_j$ ($p < 0.01$, cr_p and cr_s); (c) $LStatus_j$ ($p < 0.01$, cr_p); (d) $Ln(Age)_j$ ($p < 0.01$, cr_p and $p < 0.05$, cr_s). The significant positive association between $SEDScore_j$ and $TVolume$ is consistent with the view that firms that access capital markets need to make disclosures of social and environmental information (apart from other operational information) to reduce the information asymmetry that exists between the firm and potential investors. The positive correlation between $SEDScore_j$ and $Ln(TA)_j$ is consistent with empirical research (Cormier & Magnan, 2002) in environmental disclosure that larger firms tend to disclose more information. The positive and significant association between $SEDScore_j$ and $Ln(Age)_j$ is consistent with the researchers' view that more mature firms are likely to have to meet investor expectations, having become an established operation.

Between the independent and control variables a number of significant correlations are noted. The highest Pearson (Spearman) correlation is 0.477 (0.376) between $LStatus_j$ and $Ln(TA)_j$ ($p < 0.01$, cr_p and cr_s). The maximum cr_p and cr_s values are below critical levels (i.e., 0.8) (Hair *et al.*, 1995; Greene, 1999) for multicollinearity to be a serious concern in the cross-sectional regression analysis. Variance inflation factor (VIF) scores calculated (not tabulated) also indicate no serious problems with multicollinearity.³

Table 3: Pearson and Spearman Correlation Matrix

Variables	<i>SEDScore_j</i>	<i>Ln(Proceeds)_j</i>	<i>TVolume_j</i>	<i>Ln(TA)_j</i>	<i>LStatus_j</i>	<i>Ln(Age)_j</i>	<i>CCode_j</i>
<i>SEDScore_j</i>		-0.086	0.272*	0.680*	0.375*	0.331*	0.053
<i>Ln(Proceeds)_j</i>	0.117		0.168	0.090	-0.144	-0.217**	-0.088
<i>TVolume_j</i>	0.185	0.182		0.253**	0.280*	-0.045	0.328*
<i>Ln(TA)_j</i>	0.521*	0.385*	0.164		0.477*	0.199**	-0.183
<i>LStatus_j</i>	0.180	0.022	0.225**	0.376*		0.336*	0.216**
<i>Ln(Age)_j</i>	0.199**	-0.117	-0.126	0.118	0.350*		0.082
<i>CCode_j</i>	-0.124	-0.127	0.392*	-0.242**	0.216**	0.064	

Source: Original table.

Note: * and ** - Significant at 1% and 5%, or better, one-sided significance respectively; and see Table 1 for definitions of variables.

Cross-Sectional Regression Findings

Table 4 reports cross-sectional regression findings based on *Equation 1* for the pooled sample and two national sub-samples. For the pooled-sample (Table 4 Panel A) the coefficients on *Ln(TA)_j* ($p < 0.01$), *Ln(Age)_j* ($p < 0.05$) and *CCode_j* ($p < 0.10$) are positive and statistically significantly associated with *SEDScore_j*. These findings are consistent with theoretical and empirical expectations plus prior reported correlation findings (Table 3). Meanwhile, there is a statistically significant negative association between *Ln(Proceeds)_j* and *SEDScore_j*. The negative *Ln(Proceeds)_j* and *SEDScore_j* association implies that the larger the proceeds from issue of shares, the lower the disclosure of social and environmental information. This is inconsistent with the hypothesis discussed above.

One possible reason for this negative association is that firms issuing shares are more concerned with presenting operational and financial related information at the expense of social and environmental information. Timing of disclosures is another possible explanation for the negative relationship. That is, social and environmental disclosures may be viewed by issuing firms as good or neutral news that could increase interest in the firm, enabling higher proceeds from the share issue to be raised. In other words, firms will disclose social and environmental information in the year(s) prior to making a large issuance of equity. Coefficients on all remaining independent and control variables are insignificant from zero.

Whilst the explanatory power of the cross-sectional model based on *Equation 1* is close for the Australian and Canadian sub-samples (Table 4 Panel B and Panel C respectively) there are some differences in the significant determinants of social and environmental disclosure for oil and gas firms in each nation. For both the national sub-samples the coefficients on *Ln(TA)_j* are positive and significant ($p < 0.01$). For the Australian sub-sample the coefficient on *Ln(Proceeds)_j* is negatively and statistically significant from zero but negative and insignificant from zero for the Canadian sub-sample. However, unlike the Australian sub-sample, cross-sectional regression results for the coefficients on *Ln(Age)_j* ($p < 0.01$) are positively significantly associated with *SEDScore_j*

at conventional levels. The remaining coefficients on the independent and control variables noted in respect to the results presented in Table 4 Panel B and Panel C respectively are insignificant from zero.

Table 4: Cross-Sectional Regression Analysis of Pooled and National Sub-Samples

	General Model Based on Equation 1: $SEDScore_j = \lambda_j + \beta_1 Ln(Proceeds)_j + \beta_2 TVolume_j + \beta_3 Ln(TA)_j + \beta_4 LStatus_j + \beta_5 Ln(Age)_j + \beta_6 CCode_j + \eta_j$					
	Panel A: Pooled-Sample		Panel B: Australian Sub-Sample		Panel C: Canadian Sub-Sample	
Variables	β	<i>t</i> -statistic	β	<i>t</i> -statistic	β	<i>t</i> -statistic
$Ln(Proceeds)_j$	-0.128	-1.740##	-0.196	-2.009##	-0.180	-0.178
$TVolume_j$	0.106	1.320	0.128	1.346	0.202	1.348
$Ln(TA)_j$	0.702	7.999*	0.812	7.331*	0.503	3.433*
$LStatus_j$	-0.103	-1.156	-0.150	-1.399	0.043	0.308
$Ln(Age)_j$	0.191	2.515**	0.011	0.101	0.360	3.624*
$CCode_j$	0.142	1.752##				
<i>Constant</i>	-0.363	-7.140*	-0.466	-6.462*	-0.185	-3.257*
Summary						
<i>R</i> -Sqrt	0.521		0.576		0.611	
<i>F</i> -Statistic	19.121*		15.147*		15.761*	
<i>N</i>	101		53		48	

Source: Original table.

Note: *, ** and ## - Significant at 1%, 5% and 10%, or better, respectively based on White's Heteroscedasticity-consistent covariance matrix (White, 1980) (one-tailed significance except for the intercept that is based on two-tailed significance); and see Table 1 for definitions of variables.

Given the apparent strength of firm size as a determinant of social and environmental disclosure practices amongst oil and gas firms in Australia and Canada, it was decided to conduct additional partitioning analysis. The partitioning analysis was conducted to: (a) check the robustness of the main findings, and (b) to determine if the influence of independent and control variables shown to be insignificant (as reported in the results) were not being masked by a dominant factor such as firm size. Thus, the pooled sample was partitioned according to firm size (i.e., High social and environmental disclosers being above the median versus Low social and environmental disclosers being below the median). Cross-sectional regression analysis based on *Equation 1* was then performed again with results reported in Table 5.

The cross-sectional results for the pooled sample partitioned by firm size are reported in Panels A and B of Table 5. Coefficients on (i) $Ln(TA)_j$ (positive, $p < 0.01$ High Disclosers and $p < 0.05$ Low Disclosers), (ii) $Ln(Age)_j$ (positive, $p < 0.05$ High IC Disclosers) and (iii) $CCode(TA)_j$ (positive, $p < 0.05$ High Disclosers) are consistent with the pooled sample main results (Table 4 Panel A). Contrary to the pooled sample main results (Table 4 Panel A), the coefficient on $Ln(Proceeds)_j$ is not statistically significant for both the High

and Low Discloser sub-sample (Table 5 Panel A and B). Also, the coefficient on $Ln(Age)_j$ is positive but insignificant from zero for the Low Discloser sub-sample (Table 5 Panel B) which is inconsistent with the pooled sample main results (Table 4 Panel A).

Table 5: Cross-Sectional Regression Analysis of Firm Size

	General Model Based on Equation 1: $SEDScore_j = \lambda_j + \beta_1 Ln(Proceeds)_j + \beta_2 TVolume_j + \beta_3 Ln(TA)_j + \beta_4 LStatus_j + \beta_5 Ln(Age)_j + \beta_6 CCode_j + \eta_j$			
	Firm Size			
	Panel A: Above Median		Panel B: Below Median	
Variables	B	t-statistic	β	t-statistic
$Ln(Proceeds)_j$	-0.120	-1.084	-0.157	-0.936
$TVolume_j$	0.125	0.953	0.049	0.294
$Ln(TA)_j$	0.611	4.786*	0.408	2.579**
$LStatus_j$	-0.207	-1.589	-0.005	-0.034
$Ln(Age)_j$	0.222	1.897**	0.019	0.118
$CCode_j$	0.199	1.732**	-0.047	-0.286
<i>Constant</i>	-0.524	-4.586*	-0.163	-2.000##
Summary				
<i>R-Sqrt</i>	0.549		0.018	
<i>F-Statistic</i>	11.159*		1.150	
<i>N</i>	51		50	

Source: Original table.

Note: *, ** and ## - Significant at 1%, 5% and 10%, or better, respectively based on White's Heteroscedasticity-consistent covariance matrix (White, 1980) (one-tailed significance except for the intercept that is based on two-tailed significance); and see Table 1 for definitions of variables.

Conclusions and Future Research

The primary objective of this study is to further the present understanding of social and environmental disclosure practices. A significant contribution is that it diverges from prior research in several ways. First, unlike the majority of previous studies that examined social and environmental disclosure across a range of industry sectors, this focuses on a single industry. Also, in contrast to previous studies that focus on more established theoretical frameworks (stakeholder theory and legitimacy theory) to explain social and environmental disclosure practices, the tenets of the information cost hypothesis are used as the underlying theoretical perspective of this study. The oil and gas industry is targeted not only because of its current significance to global development, but due to growing recognition (as evidenced by advertising campaigns) by major oil and gas firms of a need to better develop sustainable practices. The study also makes the contribution where the disclosure practices of two nations at the forefront of oil and gas exploration, development and production are examined. Two nations are focussed on, not only because the oil and gas industry are key sectors to each nation's economy, but for their similar socio-political

environments, economic infrastructures and accounting regulatory frameworks as well as close historical and economic ties. These similarities and ties assist to reduce noise in the analysis thus making comparison across national boundaries more meaningful.

For empirical analysis a final sample of 101 (53 Australian and 48 Canadian) oil and gas firms was used. It was found that the average extent of social and environmental disclosure and type of social and environmental information reported did not vary significantly between Australian and Canadian oil and gas firms. Drawing on an information economics framework it was proposed that the extent of social and environmental disclosure amongst oil and gas firms to be a function of information costs. Two proxy measures were used to capture shareholder information needs and costs. The pooled sample cross-sectional regression results indicate only one information cost proxy (proceeds from issue of shares) is a significant determinant of the extent of social and environmental disclosure amongst the sample. However the directional sign for $\ln(\text{Proceeds})_i$ is contrary to our expectations. Results of national sub-sample cross-sectional regression analysis show that, in the case of Australian oil and gas firms, one information cost variable (proceeds from issues of shares) is a significant determinant but directional signs are contrary to expectations. As for the Canadian sub-sample, neither of the information cost proxies (proceeds from issue of shares and volume of shares traded) are significant with the directional sign on $\ln(\text{Proceeds})_i$ being opposite to that expected. By way of robustness checks, the pooled sample was partitioned by firm size. Neither information cost proxy is statistically significant in the cross-sectional regressions (partitioned by size). Also, there are variations across the partitioned sub-samples as to which proxies are significant and questions about the directional sign.

Taking the empirical results overall it is concluded that there is limited evidence at best to support the acceptance of *General Hypothesis 1* or *General Hypothesis 2*. Several points justify the rationalisation behind this conclusion. First, not all the proxy measures designed to capture information costs are statistically significant determinants of the extent of social and environmental disclosure. Second, of the proxy measure found to be statistically significant, the directional sign indicating the influence on social and environmental disclosure is contrary to prior empirical findings and theoretical (or practical) predictions.

Whilst the empirical findings may not provide overwhelming support for the predicted outcomes, the study is of interest to scholars, accounting practitioners and regulators alike. If, as the empirical findings appear to suggest, there is little support for information economics to provide a suitable theoretical framework to explain social and environmental disclosures, perhaps a multi-layered theoretical framework needs to be applied. For investors and firms making voluntary disclosures, the results of this study suggest that firms that access capital markets may be placing a higher emphasis on operational and financial disclosures at the expense of voluntary disclosure of social and environmental information. Alternatively, firms could be using a disclosure strategy where the disclosure of social and environmental information precedes a large issuance of equity capital.

As to the future, the results present various options for further empirical research of social and environmental disclosure practices. One particularly important and lucrative

avenue is to develop stronger proxies for information costs relating to firms accessing capital markets. Another worthwhile option is to test other theoretical perspectives (e.g., proprietary costs) for their ability to explain social and environmental disclosure practices. Proprietary costs may play a bigger role in the disclosure of social and environmental information given the increasing levels of competition in the oil and gas industry. Such work could help determine if a single or multidimensional (one perhaps involving economic, social or institutional theories) perspective is required to explain social and environmental disclosures.

Furthermore, this study only investigated a single fiscal year. Future research could investigate temporal trends and the impact on social and environmental disclosure and how this could affect the importance of potential determinants.

Appendix A: Disclosure Index for Oil & Gas companies (47 disclosure items)

Category of Social and Environmental Disclosure	Disclosed = 1 Not disclosed = 0 Not applicable = N/A
A.1 Environment	
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	
A.2.1 Conservation of energy in the conduct of business operations	
A.2.2 Using energy efficiently	
A.2.3 Utilising 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	
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	Number 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
A.4.1	Product development
A.4.2	Product safety
A.4.3	Product quality
A.4.4	Customer information
A.5	Community involvement
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

Source: This disclosure index is adapted from Williams (1999).

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References

- Akerlof, G. (1970) The market for lemons: Qualitative uncertainty and the market mechanism. *Quarterly Journal of Economics*, 89 (August) pp 488-500.
- Atiase, R. (1985) Predisclosure information, firm capitalization, and security price behaviour around earnings announcements. *Journal of Accounting Research*, 23 (Spring) pp 21-36.
- Barry, C.B. and Brown, S. J. (1985) Differential information and security market equilibrium. *Journal of Financial and Quantitative Analysis*, 20 pp 407-422.
- Botosan, C.A. (1997) Disclosure level and the cost of equity capital. *The Accounting Review*, 72 (3) pp 323-350.
- Cooke, T.E. (1989) Voluntary disclosure by Swedish companies. *Journal of International Financial Management and Accounting*, 1 (2) pp 171-195.
- Cormier, D. and Magnan, M. (1999) Corporate environmental disclosure strategies: determinants, costs and benefits. *Journal of Accounting, Auditing and Finance*, 14 (4) pp 429-451.
- Cormier, D. and Magnan, M. (2002) Performance reporting by oil and gas firms: Contractual and value implications. *Journal of International Accounting Auditing and Taxation*, 11 (2) pp 131-153.
- Cormier, D. and Magnan, M. (2003) Environmental reporting management: A continental European perspective. *Journal of Accounting & Public Policy*, 22 (1) pp 43-62.
- Cormier, D., Magnan, M. and Van Velthoven, B. (2005) Environmental disclosure quality in large German companies: Economic incentives, public pressures or institutional conditions? *European Accounting Review*, 14 (1) pp 3-39.
- Darrough, M. and Stoughton, N. (1990) Financial disclosure policy in an entry game. *Journal of Accounting and Economics*, 12 pp 219-244.
- Foster, G. (1986) *Financial Statement Analysis (2nd Ed)*. Prentice Hall, Englewood Cliffs, NJ.
- Frankel, R., McNichols, M. and Wilson, G.P. (1995) Discretionary disclosure and external financing. *The Accounting Review*, 70 (1) pp 135-150.
- Gibbins, M., Richardson, A. and Waterhouse, J. (1990) The management of corporate financial disclosure: opportunism, ritualism, policies and processes. *Journal of Accounting Research*, 28 (1) pp 121-143.
- Gray, R., Kouhy, R. and Lavers, S. (1995) Corporate social and environmental disclosure. *Accounting, Auditing & Accountability Journal*, 8 (1) pp 44-77.

- Greene, W. (1999) *Econometric Analysis (4th Edition ed)*. Prentice-Hall, New York, NY.
- Grossman, S. (1981) The role of warranties and private disclosure about product quality. *Journal of Law and Economics*, 24 pp 461-483.
- Hair, J.F., Anderson, R.E., Tatham, R.L. and Black, W.C. (1995) *Multivariate Data Analysis (4th Ed)*. Prentice Hall, Englewood Cliffs, NJ.
- Healy, P.M. and Palepu, K.G. (1993) The effect of firms' financial disclosure strategies on stock prices. *Accounting Horizons*, 7 (1) pp 1-11.
- Healy, P.M. and Palepu, K.G. (1995) The challenges of investor communication: The case of CUC International, Inc. *Journal of Financial Economics*, 38 (2) pp 111-140.
- Healy, P.M. and Palepu, K.G. (2001) Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature. *Journal of Accounting and Economics*, 31 pp 405-440.
- Kim, O. and Verrecchia, R.E. (1994) Market liquidity and volume around earnings announcements. *Journal of Accounting and Economics*, 17 (1) pp 41-68.
- Lang, M.H. and Lundholm, R.J. (1993) Cross-sectional determinants of analyst ratings of corporate disclosures. *Journal of Accounting Research*, 31 (2) pp 246-271.
- Lang, M.H. and Lundholm, R.J. (2000) Voluntary disclosure and equity offerings: Reducing information asymmetry or hyping the stock? *Contemporary Accounting Research*, 17 (4) pp 623-662.
- Marston, C. and Shrikes, P. (1991) The use of disclosure indices in accounting research: a review article. *British Accounting Review*, 23, pp 195-210.
- Merton, R.C. (1987) A simple model of capital market equilibrium with incomplete information. *The Journal of Finance*, 42 (3) pp 483-510.
- Milgrom, P.R. (1981) Good news and bad news: Representation theorems and applications. *Bell Journal of Economics*, (Autumn) pp 380-391.
- Myers, S. and Majluf, N. (1984) Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13 pp 187-222.
- Netter, J., Wasserman, W. and Kutner, M.H. (1989) *Applied Regression Models*. Richard D Irwin, Homewood, IL.
- Richardson, A. and Welker, M. (2001) Social disclosure, financial disclosure and the cost of capital. *Accounting, Organizations and Society*, 26 (7/8) 597-616.
- Rubenstein, M. (2001) Rational markets: Yes or no? The affirmative case. *Financial Analysts Journal*, 57 (3) pp 15-29.
- Scott, T. (1994) Incentives and disincentives for financial disclosure: Voluntary disclosure of defined benefit pension plan information by Canadian firms. *The Accounting Review*, 69 (January) pp 26-43.

- Skinner, D. (1994) Why firms voluntarily disclose bad news. *Journal of Accounting Research*, 32 (Spring) pp 38-60.
- Verrecchia, R.E. (1983) Discretionary disclosure. *Journal of Accounting and Economics*, 5 (3) pp 179-194.
- Williams, S.L.M. (1999) Voluntary environmental and social accounting disclosure practices in the Asia-Pacific region: An international empirical test of political economy theory. *The Journal of International Accounting*, 34 (2) pp 1-30.

Notes

- 1 Voluntary corporate disclosure can be directed to stakeholders other than investors. This study, however, restricts its scope to investor communications.
- 2 For example, standard crude oil prices on the NYMEX stood at under USD\$25 per barrel in September 2003. By 11 August 2005, the price exceeded USD\$60 per barrel for over 10 days with a record price of USD\$70.85 per barrel reached on August 29, 2005. At end of 2005 oil hovered between USD\$60-USD\$65 per barrel.
- 3 The highest calculated VIF is 3.81. As VIFs in excess of ten are deemed to be evidence of serious multicollinearity (Netter *et al.*, 1989: 40), 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.