

VOLUNTARY CARBON DISCLOSURE OF AUSTRALIA'S TOP 100 COMPANIES

*Shireenjit K. Johl**, *Beverley Jackling***, *Dimuthu A. Kothalawala****

Abstract

This paper examines disclosure practices of the top 100 Australian firms prior to the mandatory reporting of carbon practices. Specifically, the study investigates the relationship between voluntary carbon related disclosure and governance mechanisms, such as board and audit committee independence, audit committee financial expertise and the existence of a voluntary committee dedicated to environmental/climate change related matters. This paper utilises a quantitative approach employing two regression based estimations. The results suggest that two governance-related variables, namely, audit committee financial expertise and the existence of a voluntary committee dedicated to environmental/ climate change strongly influences the level of voluntary carbon disclosure. This paper adds to the much needed research on carbon reporting and its implication for accounting.

Keywords: Voluntary Carbon Disclosure, Governance Mechanisms, Australian Companies

* *School of Accounting, Economics and Finance, Deakin University*

** *Corresponding author, Faculty of Business and Law, Victoria University, 300 Flinders Street, Melbourne, VIC, Australia*

Tel: + 61 3 9919 1541

Fax: + 61 3 5227 1035

Email: beverley.jackling@vu.edu.au

*** *School of Accounting, Economics and Finance, Deakin University*

1. Introduction

In recent years there have been strong demands for corporations to respond to the challenges of climate change. One important aspect is the issue of managing, accounting and communicating firm level carbon emissions. The Australian Greenhouse Office predicts that about 300 firms will report their emissions and energy use for the period 2008–2009, and that this will expand to 700 firms in the 2010–2011 reporting period (Commonwealth of Australia, 2008). Because climate change regulations have implications for businesses in reducing their emission levels, the firm's internal corporate governance mechanisms such as its board and sub committees are important in motivating or acting as drivers (or barriers) to carbon management and reporting. Against this backdrop, this study examines the level and nature of voluntary carbon disclosure by the top 100 Australian companies. More specifically, it investigates the association between voluntary carbon disclosure and the independent board and audit committee, audit committee financial expertise and the existence of voluntary special committees dealing with environmental/climate change related matters.

This study is motivated by the fact that reporting carbon emissions is a relatively new concept in corporate reporting and very few empirical studies have examined the issue of carbon (or Greenhouse Gas emission - GHG) disclosure in the context of voluntary reporting. This study differs from most prior voluntary disclosure studies in that it focuses on a relatively new type of disclosure, i.e. carbon disclosure via the Carbon Disclosure Project (CDP, 2008) and (CDP, 2009). Other studies such as Anderson and Frankle (1980); Hackettson and Milne (1996) investigate other types of voluntary disclosure such as, financial, non-financial, and social and environment responsibilities, which are disclosed either in the annual reports, stand-alone reports such as sustainability (CSR reports) or the firms' websites. In addition, to date, only a few studies (e.g. Cerbioni and Parbonetti, 2007; Lim *et al.*, 2007) have examined the relationship between corporate governance attributes such as board independence and audit committee independence, and voluntary disclosure.

The structure of the paper is as follows. The next section presents a review of prior literature in the field and hypotheses development. Section 3 describes the sample data and research methodology, and section 4 presents the analyses of data and relevant findings. The final section provides a summary of the findings.

2. Literature review and hypothesis development

Generally, firms' disclosures can be categorised as either mandatory or voluntary. Unless it is mandatory, the firm can decide whether they need to disclose voluntary information or not. The decision to make voluntary disclosures (such as environmental/carbon) can be explained either by "cost-benefit considerations" or "legitimacy theory". In conjunction with the first view (i.e. cost-benefit considerations), Berthelot *et al.* (2003) argues that the extent of voluntary disclosure is dependent on managers' willingness to communicate such information after considering the net ramifications of doing so. A firm may not disclose environmental related information if it believes that the information is proprietary and if disclosed can be used by other parties and in turn can have a detrimental effect on the firm. On the other hand, firms in strong financial conditions may disclose such information if it is perceived to provide reputational benefit. From the agency theory perspective, voluntary disclosure is argued to directly influence the reduction of information asymmetry (Lev, 1992; Lang and Lundholm, 2000). For example, it is argued that voluntary disclosure reduces the risk of investing, which, in turn, gives efficient investment decisions (Gray *et al.*, 1990; Garcia-Meca and Martinez, 2007) reduces the cost of capital, reduces the cost of equity (Botosan and Plumlee, 2002; Kristandl and Bontis, 2007) and cost of issuing debt (Sengupta, 1998). Finally, from an agency theory perspective voluntary disclosure can be viewed as having a positive influence on accurate analysts' forecast of a firms' future (Lang and Lundholm, 1996; Garcia-Ayuso, 2003).

3. Board independence and level of voluntary carbon disclosure

The value of independent directors is dependent on their reputation as experts in decision control (Fama and Jensen, 1983). To maintain their reputation the independent directors typically exercise their decision control power in favour of shareholders and stakeholders (Cheng and Courtenay, 2006). It is expected that independent directors will insist on more voluntary disclosure in order to make their value-adding process visible to other stakeholders and to signal to the market that they are carrying out their responsibility (Lim *et al.*, 2007). Additionally, independent directors have incentives in providing voluntarily disclose information, in order to reduce their own risk exposure (Lim *et al.*, 2007).

The findings from prior studies are mixed in terms of the role of independent directors and voluntary disclosure. For instance, Forker (1992) found a negative relationship between the quality of share option disclosure in financial statements and the number of independent directors on the board. Similarly, Eng and Mak (2003), using a sample of firms listed on the Singapore exchange, found that boards with a low proportion of independent directors on the board, were more likely to disclose increased voluntary information to outside investors. In contrast, Chen and Jaggi's (2000) study of 87 Hong Kong listed firms revealed a positive association between independent directors and the comprehensiveness of financial disclosure. A similar positive association between independent directors and voluntary disclosure was found in Cheng and Courtenay (2006) and Cerbioni and Parbonetti (2007).

Although prior evidence is mixed, the agency theory approach is adopted in this study. It is expected that boards that are dominated by independent directors will have more effective governance as they are less associated with management. This in turn will be anticipated to result in greater accountability and be manifested through more voluntary carbon disclosure. Accordingly, the first hypothesis tested in this study is:

H1: There is a positive association between board independence and the level of voluntary carbon disclosure

4. Audit committee independence and level of voluntary carbon disclosure

The independence of audit committees is widely accepted as an important attribute for good governance and internal control (Chan and Li, 2008). It is expected that greater independence of the audit committee will enhance the financial information quality by having a more accurate assessment of top management

decisions and performance and will align the interests of managers and shareholders (Cerbioni and Parbonetti, 2007). For instance, Abbott *et al.* (2000) found audit committees with a majority of independent directors are less likely to indulge in fraudulent or misleading reporting. Likewise, Karamanou and Vafeas (2005) using a sample Fortune 500 firms, found audit committee independence was associated with higher financial disclosure quality. More specifically related to this study, Cerbioni and Parbonetti (2007) found audit committee independence was positively associated with the level and quality of voluntary disclosure.

Therefore, based on the above discussion, the second hypothesis of this study is as stated below:

H2: There is a positive association between audit committee independence and the level of carbon disclosure

5. Audit committee financial expertise and level of voluntary carbon disclosure

Management teams prepare disclosure reports but audit committees ultimately have responsibility for overseeing corporate financial reporting. The ASX code of corporate governance requires audit committees in Australia to have at least one member who is a financial expert and thus able to identify issues of concern and promote voluntary disclosures. To date most of the prior studies related to audit committees have investigated the relationship between financial expertise and audit committee effectiveness, earnings management, earnings restatement, internal control effectiveness and firm value. The results from these studies (e.g. Krishnan, 2005; Xie *et al.*, 2003) in general support the contention that audit committee financial experts add value to the firm. Using 2002 S&P 500 survey (Patel and Dallas, 2002), Felo (2009) found a positive association between independent directors and financial expertise and transparent disclosure. This paper extends the research on voluntary disclosure by examining the financial expertise of audit committees to address voluntary carbon disclosure. Hence, the discussion above leads to the third hypothesis:

H3: There is a positive association between the proportion of financial expertise on the audit committee and the level of voluntary carbon disclosure

6. Environmental or climate change committee and the level of voluntary carbon disclosure

The establishment of a special committee for environmental /climate change, which is responsible for all the company environmental issues, is a voluntary action from the firm (Buffler, 2004). In instances where these committees are established it is expected that corporate environmental reporting will be a function of that special committee. It is expected that one of the committee's responsibility will be to promote the firm's disclosure of their carbon and environmental information. As there is no prior research to support the role of a specific climate change or environmental related committee on voluntary disclosure, this study tests the following hypothesis:

H4: There is a positive association between the existence of a specific committee for climate change/environmental related committee and the level of carbon disclosure

7. Data description

The sample used in this study consists of ASX100 firms as at 30 June 2007. The data for this study comes primarily from three sources: 1) voluntary carbon disclosure data collected from the Carbon Disclosure Project (2008) and CDP (2009)^[1] database; 2) corporate governance (hypotheses variables) data were primarily hand collected from 2007 annual reports; and 3) control variables data were obtained from Finanalysis database. Our final sample (90 observations) excludes firms with missing control variables.

For the CDP (2008), 72% (72 of the top 100 Australian firms) participated in survey. Of these 72 firms, 18 (25%) did not make their response available to the public. In essence, only 54% of the top 100 Australian firms agreed to make their response available for public view. Hence, in deriving the voluntary carbon disclosure index for this study, 47 publicly available questionnaires were used. Firms that

¹ On an annual basis, the CDP surveys the top firms from all over the world. The firms' responses to the survey are made available to the public on the CDP website.

participated but did not make their response available to the public were given a score of zero. From the participating (and publicly available) firms in the sample, 18 (38.3%) firms were identified as “Greenhouse intensive”^[2], while 29 (61.7%) firms were identified as “other than GHG intensive” (includes other climate change exposed firms^[3] and less exposed firms^[4]).

Table 1 displays the industry sector representation in the total sample (N=90) (and participating sample (N=47)) varies across all sectors with the highest representation from the financial sector (26% (31% for participating sample), followed by material 20% (26% for participating firms) and industrial sector 14% (10% for the participating sample firms). The least represented sectors are utilities, telecommunication and information technology with representation of about 1% for each in both the total and participating sample.

Table 1. Number and percent of firms by industry classification

GICS Sector	Total		CDP Firms	
	N	%	N	%
Energy	7	7.78	2	4.26
Material	18	20.00	12	25.53
Industrial	13	14.44	5	10.64
Consumer Discretionary	11	12.22	2	4.26
Consumer Staples	8	8.89	4	8.51
Health Care	5	5.56	3	6.38
Financials	23	25.56	15	31.91
Information Technology	1	1.11	1	2.13
Telecommunication	2	2.22	2	4.26
Utilities	2	2.22	1	2.13
Total	90		47	

Table 2 provides descriptive summaries for voluntary carbon disclosure level, governance related and firm characteristics for the total sample and sub-sample. The variable Voluntary Carbon Disclosure Score (CDSCORE) is measured by utilising a self-constructed disclosure index. This index has four main parts: Risks and opportunities; Greenhouse Gas emissions accounting; performance and Governance. The calculation of the index is outlined more fully in the next section of the paper however it is suffice to state at this point that the voluntary carbon disclosure index is based on a maximum possible raw score for a firm of 66.

As shown in Table 2 the mean level of voluntary carbon disclosure, in the full sample (and sub-sample) is relatively low at 26.167 (50.107) and ranges between 0 (4.08) and 89.8 (89.8)^[5]. In terms of the nature of voluntary carbon disclosure, overall the disclosure levels for GHG emission, performance and governance are quite comparable however; the firms tend to disclose more about their risk and opportunities related to climate change.

² The CDP defines “Greenhouse intensive sectors” as firms primarily operating in sectors that are considered relatively high in GHG emissions, including utilities, chemicals, construction materials, oil and gas, metals, mining and transportation.

³ The CDP classifies property, food & beverage, finance and mining contractors as “Other Climate change exposed sectors”.

⁴ The CDP classifies the remaining industry sectors, other than those classified as “Greenhouse intensive sectors” and “Other Climate change exposed sectors”, as “Less exposed sectors”.

⁵ The means values for section 1-Risk and Opportunity, Section 2- GHG Emission Accounting, Section 3-Performance and Section 4-Governance are 24.259, 21.556, 21.852 and 21.389 respectively.

Table 2. Descriptive statistics: Continuous and dichotomous variables in the model of carbon disclosure

	Full Sample (N=90)					Participating Sub-Sample (N=47)				
Continuous Variables	Min	Max	Mean	Median	Std. Dev.	Min	Max	Mean	Median	Std. Dev.
<i>Voluntary Carbon Disclosure Level</i>										
Carbon Disclosure Score (CDSCORE)	0	89.80	26.167	10.20	28.938	4.08	89.80	50.107	51.02	19.863
<i>Governance Variables</i>										
Proportion of Independent directors (PINDB)	.182	.909	.685	.714	.158	.375	.909	.724	.750	.132
Proportion of Independent Audit Committee members (PINAC)	0.500	1.000	0.906	1.000	0.149	.600	1.000	.916	1.000	.141
Proportion of Audit committee Financial Expertise (PFEXAC)	0.200	0.750	0.432	0.333	0.152	.250	.750	.500	.500	.149
<i>Firm Characteristics</i>										
Total Assets (\$AUD million)	585	125,800	11,850	5,164.7	22,155	585	115,008	15,534	7,353	24,479
Log of Total Assets (SIZE)	8.768	11.061	9.739	9.689	0.447	8.768	11.061	9.877	9.866	.505
Return on Equity (ROE)	-0.138	91.420	1.219	0.175	9.616	-.038	.839	.196	.177	.153
	Full Sample (N=90)					Participating Sub-Sample (N=47)				
Dichotomous Variables	Firms coded "1"	%	Firms coded "0"	%	Firms coded "1"	%	Firms coded "0"	%		
<i>Special committee and Sustainability Report</i>										
Climate Change or environmental committee (SCCC)	45	50.0	45	50.0	30	63.8	17	36.2		
<i>Firm Characteristics</i>										
Negative Earnings (LOSS)	84	93.3	6	6.7	46	97.9	1	2.1		
Issuance of new capital (NEWEQUITY)	51	56.7	39	43.3	26	55.3	21	44.7		
Greenhouse Gas Intensive Sector (GHGINT)	29	32.2	61	67.8	18	38.3	29	61.7		

Turning to Governance, and in particular, board independence (measured in terms of proportion of independent directors on the board – PINDB) on average the number of independent directors in the sample is 69% in sample firms (72% in participating firms). In terms of audit committee independence (measured in terms of the proportion of independent directors in the audit committee – PINDAC), on average sample firms have 91% (participating firms 92%) independent directors on the audit committee. Moving to audit committee financial expertise (measured in terms of the proportion of directors with financial expertise – PFEXAC), the mean percentage of sample firms audit committee financial expertise is 43% (participating firms 50%). With regards to a sub (special) committee for climate change or environmental related issues sample firms have 50% (participating firms 64%) have such a committee.

8. Model specification

Based on prior voluntary disclosure literature the following ordinary least squares regression model is used to test each of the hypotheses.

$$\text{CDSCORE} = a_0 + \beta_1\text{PINDB} + \beta_2\text{PINAC} + \beta_3\text{PFEXAC} + \beta_4\text{SCCC} + \beta_5\text{SIZE} + \beta_6\text{LOSS} + \beta_7\text{ROE} + \beta_8\text{CR} + \beta_9\text{NEWEQUITY} + \beta_{10}\text{GHGINT} + \text{error}$$

Where:

CDSCORE is Carbon Disclosure Score and is the the ratio of actual raw score of items disclosed, divided by the maximum possible raw score of all items disclosed.

PINDB is the proportion of independent directors on the board

PINDAC is the proportion of independent directors on the audit committee

PFEXAC is the proportion of financial experts on the audit committee

SCCC is the existence of a Special Committee for Climate Change or environmental committee and takes a dummy variable, 1 if the firm has a Special Committee for Climate Change, 0 otherwise

SIZE is firm size and is measured as the natural log of total assets as at year ended 2007

LOSS is a dummy variable, 1 if the company's net income is negative in 2007, 0 otherwise

ROE is return on equity ratio and is measured as profit before tax to total equity for year 2007

NEWEQUITY is a dummy variable, 1 if firm issue new share capital in following year (2008), 0 otherwise

GHGINT is a dummy variable, 1 if company is greenhouse intensive one, 0 otherwise

The dependent variable is the level of voluntary carbon disclosure (CDSCORE) and is measured by utilising a self-constructed disclosure index based on prior studies that have used this technique (e.g. Eng and Mak, 2003; Gul and Leung, 2004). The purpose of using an index is to score firms based on the quantity and level of detail for the disclosures made in the CDP survey. There are four main parts to the CDP survey: 1) Risks and Opportunities (risk exposure and opportunities re regulation, physical changes and general risks related to climate change), 2) Greenhouse Gas (GHG) Emissions Accounting (including information about reporting boundary, methodology to calculate GHG emissions), 3) Performance (including emission reduction plans, emission intensity and future emissions usage) and 4) Governance (including executive responsibility and incentive mechanisms on climate change).

The scoring approach (with slight adaptation) is based on the technique used in the Carbon Disclosure Leaders Index (CDLI). Although the CDLI is an index prepared by CDP, it is not made available for all Australian participating firms. The index utilises two scoring approaches, namely, binary (1 or 0) and variable scoring where a score of up to 3 points is awarded based on the number of words in narrative responses. The maximum possible raw score a firm can obtain is 66. From these raw scores, the voluntary carbon disclosure index (CDSCORE)^[6] for each company is then calculated.

The hypotheses variables of interest in this paper are board independence (PINDB), audit committee independence (PINDAC), audit committee financial expertise (PFEXAC), and the existence of a special committee for environmental and climate change related issues (SCCC). Based on our hypotheses, the study expects a positive association between PINDB and CDSCORE, predicting that firms with a greater proportion of independent directors have higher levels of voluntary carbon disclosure. With regards to

⁶ The 'Total Score' of *i*th firm is the first score given to the item according to the number of words for that item's response. *Total Raw Score of *i*th firm is addition of Raw Scores in four sections within the check list.

***CDSCORE_{*i*} = (Total Raw Score_{*i*} / Maximum Possible Raw Score (66) x 100).

audit committee characteristics, we expect a positive relationship between PINDAC (PFXDAC) and CDSCORE. In terms of the existence of a sub committee for environmental and climate change related issues, we expect the coefficient for SCCC to be positive.

In addition, the model controls for other firm characteristics which have been used in prior voluntary disclosure studies. Because our sample size is small, we limit our control variables to five variables. Specifically, we control for: 1) firm size measured using log of assets and a positive relationship is predicted as larger firms are more likely to make voluntary carbon disclosure (CDSCORE) because of the lower average cost to collecting and disseminating information; 2) loss making firms, which is expected to be positively related to CDSCORE as such firms are more likely to provide more information to justify their loss for the current year; 3) increase in equity, which is predicted to be positively associated to CDSCORE; 4) profitability, proxied by return on equity, which is anticipated to be positively related to CDSCORE; and 5) greenhouse gas intensive firms, which is expected to be positively associated with CDSCORE.

9. Findings

Two estimations were carried out and are reported in Table 3. The first estimation (Estimation 1) uses the full sample (N=90) while the second estimation (Estimation 2) uses a sub-sample of only CDP participating firms (N=47). As shown in the table, models are well specified and have reasonably good explanatory power with an R² of 47.6% and 30.8% for estimations 1 and 2, respectively.

Table 3. OLS regression results for voluntary carbon disclosure score and governance mechanisms

	Expected Sign	Estimation 1	N=90	Estimation 2 ⁷⁾	N=47
		Coefficient	t-statistic	Coefficient	t-statistic
(Constant)		-253.454	-5.50	-118.409	-2.04
PINDB	+	27.539	1.57	28.129	1.05
PINAC	+	-2.842	-0.18	2.387	0.11
PFEXAC	+	81.037	5.15***	33.398	1.67**
SCCC	+	11.507	2.18**	7.913	1.43*
SIZE	+	20.354	4.33***	13.810	2.64***
LOSS	+	22.681	2.42***	-15.835	-2.08**
ROE	+	-.131	-2.19**	1.741	0.10
NEWEQUITY	+	6.365	1.18	4.360	0.76
GHGINT	+	-.881	-0.14	1.428	0.25
Adjusted R ²		0.475		0.3084	
F-Stat		26.17		NA	

* Correlation is significant at the 0.1 level (1-tailed); ** Correlation is significant at the 0.05 level (1-tailed)

***Correlation is significant at the 0.01 level (1-tailed).

9.1 Hypothesis 1 – board independence

Hypotheses 1 investigates the relationship between board independence (PINDB) and the level of voluntary carbon disclosure. As shown in table 3, PINDB is positive and moderately significant in estimation 1 (Coefficient 27.53, p<0.06, one-tailed), providing some support to hypothesis 1. The results in part are consistent with prior findings such as Chen and Jaggi (2000) and Cheng and Courtenay (2006)

⁷ Due to the small number of observations in Estimation 2, we reestimated the model using a small set of independent variables (PINDB PINAC PFEXAC SCCC SIZE LOSS). Our results are similar (but stronger) to Table 3.

which are based on Hong Kong and Singapore data respectively. They found that firms with boards consisting of a large proportion of independent directors are associated with high levels of voluntary disclosure. In summary, our findings provide some support to the argument that independent directors will insist on more voluntary disclosure in order to make their value-adding process visible to other stakeholders and to signal to the market that they are carrying out their responsibility.

9.2 Hypothesis 2 – audit committee independence

Hypothesis 2 deals with the independence of the audit committee (being the proportion of independent directors to the total number of directors in the audit committee - PINDAC) and the extent of carbon disclosure. As shown in the Table 3, PINDAC is not significant in both estimations. These results contrast with the results from the Cerbioni and Parbonetti (2007) findings, in which they find that audit committee composition is positively associated with the level of voluntary disclosure.

9.3 Hypothesis 3 – audit committee financial expertise

Hypothesis 3 predicts a positive relationship between the proportion of financial expertise in the audit committee (PFEXAC) and the level of carbon disclosure (CDSCORE). As expected and as shown in Table 3, the coefficient between PFEXAC and CDSCORE is positive and significant, in estimation 1 (Coefficient 81.03, $p < 0.01$, one-tailed) and estimation 2 (Coefficient 33.39, $p < 0.05$, one-tailed), thus, providing support for H3. This result is consistent with the findings of Felo (2009), in that, he found a positive association between board financial expertise and financial transparency disclosure. The results indicate that financial expertise does add value in terms of effectiveness and is exhibited not only in enhancing financial reporting quality but also in providing more transparent (voluntary) disclosure.

9.4 Hypothesis 4 – voluntary environmental (climate change) committee

Hypothesis 4 predicts a positive relationship between the existence of a special committee for climate change/environmental related committee (SCCC) and the level of carbon disclosure (CDSCORE). As shown in table 3, the coefficient between CDSCORE and SCCC is positive and significant in estimation 1 (Coefficient 11.51, $p < 0.05$, one-tailed) and in estimation 2 (Coefficient 7.91, $p < 0.1$, one-tailed), thus, providing support for H4. As predicted the results provide strong evidence that the existence of such a committee enhances the level of voluntary carbon information.

10. Conclusions

This paper adds to the research on carbon reporting and its implication for accounting. In particular we have analysed how corporate governance mechanisms affect top 100 ASX carbon disclosure practices. We examined the linkages of corporate governance and carbon disclosure (via CDP), because major corporations are generally facing greater demands/pressure to be transparent and disclose information about their management, accounting and communicating of carbon emissions.

The findings of the study indicate that audit committee financial expertise and the existence of a voluntary committee dedicated to environmental/climate change is important in influencing the level of voluntary carbon disclosure. The results show a positive though slightly weak relationship between board independence with the level of voluntary carbon disclosure. However, no evidence was found for the relationship between audit committee independence with the level of voluntary disclosure. Given the reporting requirement is mandatory as of 31 October 2009, the results of this study provide useful insights for a broad range of stakeholders affected by the National Greenhouse and Energy Reporting Act, 2007.

References

1. Abbott, L.J., Park, Y. and Parker, S. (2000), "The effects of audit committee activity and independence on corporate fraud", *Managerial Finance*, Vol. 26 No. 11, pp. 55-67.
2. Anderson, J.C. and Frankle, A.W. (1980), "Voluntary social reporting an iso-beta portfolio analysis", *The Accounting Review*, Vol. 55 No. 3, pp. 467-479.
3. Berthelot, S., Cormier, D. and Magnan, M. (2003), "Environmental disclosure research: Review and synthesis", *Journal of Accounting Literature*, Vol. 22 No. 3, pp. 1-44.

4. Botosan, C.A. and Plumlee, M.A. (2002), "A Re-examination of Disclosure Level and the Expected Cost of Equity Capital", *Journal of Accounting Research*, Vol. 40 No. 1, pp. 21-40.
5. Buffler, P.A. (2004), "Book review: New tools for environmental protection: Education, information, and voluntary measures", *Environmental Health Perspectives*, Vol. 112 No. 2, p. 130.
6. Carbon Disclosure Project (CDP). (2009), available at: <https://www.cdproject.net/en-US/Pages/HomePage.aspx> (accessed 30 October 2009).
7. Carbon Disclosure Project Report. (2008), Australia & New Zealand, available at: https://www.cdproject.net/CDPResults/65_329_151_CDP%20Australia%20and%20New%20Zealand%20Report%202008.pdf (accessed 12 October 2009).
8. Cerbioni, F. and Parbonetti, A. (2007), "Exploring the effects of corporate governance on intellectual capital disclosure: An analysis of European biotechnology companies", *European Accounting Review*, Vol. 16 No. 4, pp. 791-826.
9. Chan, K.C. and Li, J. (2008), "Audit committee and firm value: Evidence on outside top executives as expert-independent directors", *Corporate Governance: An International Review*, Vol. 16 No. 1, pp. 16-31.
10. Chen C.J.P. and Jaggi, B. (2000), "Association between independent non-executive directors, family control and financial disclosure in Hong Kong", *Journal of Accounting and Public Policy*, Vol. 19, pp. 285-310.
11. Cheng, E.C.M. and Courtenay, S.M. (2006), "Board composition, regulatory regime and voluntary disclosure", *The International Journal of Accounting*, Vol. 41, pp. 262-289.
12. Commonwealth of Australia. (2006), *Climate change impacts and risk management: A guide for business and government*: Department of Environment and Heritage, Australian Greenhouse Office, Australia.
13. Commonwealth of Australia. (2008), *National greenhouse and energy reporting guidelines*. Department of Climate Change, Australia.
14. Eng, L. and Mak, Y. (2003), "Corporate governance and voluntary disclosure", *Journal of Accounting and Public Policy*, Vol. 22, pp. 325-345.
15. Fama, E.F. and Jensen, M.C. (1983), "Separation of ownership and control", *Journal of Law and Economics*, Vol. 26 No.2, pp. 301-325.
16. Felo, A.J. (2009), "Voluntary disclosure transparency, board independence and expertise, and CEO duality", Working Paper, available at SSRN: <http://ssrn.com/abstract=1373942> (accessed 14 March 2010).
17. Forker, J.J. (1992), "Corporate governance and disclosure quality", *Accounting and Business Research*, Vol. 22, pp. 111-124.
18. Garcia-Ayuso, M. (2003), "Factors explaining the inefficient valuation of intangibles", *Accounting, Auditing and Accountability Journal*, Vol. 16 No. 1, pp. 57-69.
19. Garcia-Meca, E. and Martinez, I. (2007), "The use of intellectual capital information in investment decisions: An empirical study using analyst reports", *The International Journal of Accounting*, Vol. 2, pp. 157-181.
20. Gray S.J., Radebaugh L.H. and Roberts C.B. (1990), "International perceptions of cost constraints on voluntary information disclosures: A comparative study of UK and US multinationals", *Journal of International Business Studies*, Vol. 21 No. 4, pp. 597-621.
21. Gul, F.A. and Leung, S. (2004), "Board leadership, outside directors' expertise and voluntary corporate disclosures", *Journal of Accounting and Public Policy*, Vol. 23, pp. 351-379.
22. Hackston, D. and Milne, M. (1996), "Some determinants of social and environmental disclosures in New Zealand", *Accounting, Auditing and Accountability Journal*, Vol. 9 No. 1, pp. 77-108.
23. Karamanou, I. and Vafeas, N. (2005), "The association between corporate boards, audit committees, and management earnings forecasts: An empirical analysis", *Journal of Accounting Research*, Vol. 43, 453-486.
24. Krishnan, J. (2005), "Audit committee quality and internal control: An empirical analysis," *The Accounting Review*, Vol. 80 No. 2, 649-675.
25. Kristandl, G. and Bontis, N. (2007), "The impact of voluntary disclosure on cost of equity capital estimates in a temporal setting", *Journal of Intellectual Capital*, Vol. 8 No. 4, pp. 577-594.
26. Lang, M.H. and Lundholm R.J. (1996), "Corporate disclosure policy and analyst behaviour", *The Accounting Review*, Vol. 71 No. 4, pp. 467-492.
27. Lang, M.H. and Lundholm, R.J. (2000), "Voluntary disclosure and equity offerings: Reducing information asymmetry or hyping the stock?" *Contemporary Accounting Research*, Vol. 17 No. 4, pp. 623-662.

28. Lev, B. (1992), "Information disclosure strategy", *California Management Review*, Vol. 34, pp. 9-32.
29. Lim, S., Matolcsy, Z. and Chow, D. (2007), "The association between board composition and different types of voluntary disclosure", *European Accounting Review*, Vol. 16, pp. 555-583.
30. Patel, S.A. and Dallas, G. (2002), *Transparency and disclosure: Overview of methodologies and study results – United States*, Standard and Poor's, New York, NY.
31. Sengupta, P. (1998), "Corporate disclosure quality and the cost of debt", *The Accounting Review*, Vol. 73 No. 4, pp. 459-474.
32. Xie, B., Wallace N.D. and Peter J.D. (2003), "Earnings management and corporate governance: The role of the board and the audit committee", *Journal of Corporate Finance*, Vol. 9 No. 3, pp. 295-316.