

1-1-1995

## **Voluntary environmental disclosure by Australian listed mineral mining companies : an application of stakeholder theory**

Y. B. Hutomo  
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**VOLUNTARY ENVIRONMENTAL  
DISCLOSURE BY AUSTRALIAN LISTED  
MINERAL MINING COMPANIES: AN  
APPLICATION OF STAKEHOLDER THEORY**

**By**

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**A Thesis Submitted in Partial Fulfilment of the  
Requirements for the Award of**

**Master of Business (Accounting)**

**at the Faculty of Business, Edith Cowan University**

**Date of Submission: 31 May 1995**

## ABSTRACT

The purpose of this study was to examine the extent of voluntary environmental disclosure in relation to firm-specific characteristics of listed mineral mining firms within the stakeholder theory framework developed by Ullmann (1985). Three indices, word index, unweighted index and weighted index, were applied to measure the extent of total environmental disclosure and categories of total disclosure, which were environmental policy and strategy, public recognition of environmental activities, prevention or repair of environmental damage and environmental liabilities.

A sample of 104 mineral firms was selected from the Australian Graduate School of Management Annual Report Microfiche File for 1993. The relationships between the extent of environmental disclosure for the three indices, for total disclosure and each category of disclosure, and firm characteristics for twelve models in the stakeholder theory were tested by using multivariate analysis.

It was found that the extent of environmental disclosure best fitted the unweighted index. The most significant form of disclosure was environmental policy and strategy and the least significant was environmental liabilities. All of the dimensions of stakeholder theory were not found to be present in any of the best models for total disclosure and each category of disclosure. The implications of these findings are that alternative variables for the stakeholder model need to be considered; that users of the annual report may obtain the best explanation of environmental disclosure through the use of an unweighted index; and that regulators of accounting information need to further examine the existing disclosure of environmental liabilities.

## DECLARATION

"I certify that the thesis does not incorporate, without acknowledgment, any material previously submitted for a degree or diploma in any institution of higher education and that, to the best of my knowledge and belief, it does not contain any material previously published or written by another person except where due reference is made in the text".

## ACKNOWLEDGMENT

I wish to gratefully acknowledge the following institutions and people who gave valuable supervision, guidance and support in the completion of this thesis:

- \* Theo Christopher for his patient guidance and invaluable advice in his capacity as supervisor.
- \* Professor Gary Monroe, Associate Professor Colin Dolley, and Dr. Peter Standen for their advice and support in research methodology areas.
- \* Project of Accounting Education Development at Directorate General of Higher Education of Education and Culture Department and the University of Atma Jaya Yogyakarta in Indonesia, which provided financial support for undertaking the Master's degree.
- \* My patient and supportive wife, Elizabeth Sri Pudyastuti, and my two sons, Andri Pudyastomo and Benny Pudyastanto, who missed their father.

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## GLOSSARY OF ABBREVIATION

AARF	Australian Accounting Research Foundation
AAS	Australian Accounting Standard
AASB	Australian Accounting Standards Board
AASX	Australian Associated Stock Exchange
AGSM	Australian Graduate School of Management
AMIC	Australian Mining Industry Council
ANOVA	Analysis of Variance
ASX	Australian Stock Exchange
BCA	Business Council of Australia
CEP	Council on Economic Priorities
CSR	Corporate Social Responsibility
EPA	Environmental Protection Agency
ITAA	Income Tax and Assessment Act
K-S	Kolmogorov-Smirnov
MBA	Master of Business Administration
OLS	Ordinary Least Squares
OSHA	Occupational Safety and Health Administration
PSASB	Public Sector Accounting Standards Board
RMS	Risk Measurement Service
ROA	Return on assets
ROE	Return on equity
SAC	Statement of Accounting Concepts
SEC	Stock Exchange Commission
S-W	Scholes-Williams
VIF	Variance Inflation Factor
WLS	Weighted Least Squares

## Chapter 1

### INTRODUCTION

#### 1.1 Statement of the Problem

In Australia, in recent decades, concern for the environment has increasingly received public attention. This increasing societal concern for environmental matters has heightened the demand for companies to be environmentally responsible. Mining companies have responded to the concern by implementing environmental activities and disclosing them in the annual report.

Voluntary corporate environmental disclosure in the annual report has long been practiced by Australian companies (Trotman, 1979; Guthrie and Parker, 1989). Researchers believe that there are factors driving firms to voluntarily disclose environmental information in the annual report and that this has resulted in a number of theories being proposed to explain the incidence of environmental disclosure.

Investors and potential investors are interested in environmental information because environmental activities may have significant financial implications for companies (Gowland, 1995). It is noted that the annual report is a source of information actively sought by users (Anderson and Epstein, 1995; Tilt, 1994; C. B. Roberts, 1991; Zeghal and Ahmed, 1990) because it contains information that enables users to assess potential financial effects of environmental concerns (Gibson and O'Donovan, 1994). Despite the existence of various environmental acts in Australia, the disclosure of environmental information in the annual report is not mandatory.

Given the perceived importance of environmental disclosure to the users of the annual report, this study attempts to explain the voluntary disclosure of this information by Australian listed mineral mining companies.

## **1.2 Purpose of the Study**

The purpose of the study is to explain the inclusion, and the extent of, voluntary environmental disclosure practices in the 1993 annual reports of Australian listed mineral mining companies. Voluntary environmental disclosure is defined as any disclosure of monetary, non-monetary, quantitative, or non-quantitative information about environmental activities of a company that is not required by any form of legislation or standard (Cooke, 1989). In this study, the environmental information is confined to that provided in the annual report.

The inclusion and the extent of voluntary environmental disclosure in the corporate annual report is examined by constructing three separate indices of disclosure and assessing their association with selected firm-specific characteristics. There are eleven corporate characteristics tested in this study and their relationships to the extent of environmental disclosure are empirically examined in terms of overall disclosure and four categories of disclosure.

The incidence of voluntary environmental disclosure is discussed in the framework of stakeholder theory. Corporate environmental reporting is examined from the perspective of the major stakeholder groups (Dierkes and Anthal, 1985) because "the use of the stakeholder concept is to provide information to strategists at a generic level . . ." (Freeman, 1983, p. 36).



Stakeholder conceptual framework, as developed by Ullmann (1985), is applied in this study to explain the incidence of voluntary environmental disclosure.

### **1.3 Significance and Contribution of the Study**

The significance of the study is that there is a large number of mining companies in Australia and this has implications for the environment. This industry tends to be pressured from environmental groups (Deegan and Gordon, 1994) as its activities may damage the environment. This requires environmentally responsible actions from companies and the need to provide environmental information. Accordingly, this study provides information on the extent and the inclusion for environmental disclosure in the 1993 annual report of listed mineral mining companies in Australia. This information is valuable for the regulators and users of the corporate annual report.

Thus far, there has been limited published research on environmental disclosure undertaken in Australia. This study extends prior research on environmental disclosure in Australia and overseas countries and contributes in two directions: first, by examining the relationship between a number of corporate characteristics within the dimensions of stakeholder theory and categories of environmental disclosure and, second, the examination of the extent of disclosure by a variety of indexing methods. Three indices, the number of words (referred to later as word index), dichotomous index (referred to later as unweighted index) and the relative importance of items (referred to later as weighted index), are selected. The reason is that they have different approaches to content analysis. This gives

fruitful insights as to the motivations of management and the likelihood of management to voluntarily disclose a certain category of environmental information. This should increase the understanding of practices of voluntary environmental disclosures in Australia by listed mineral mining companies.

#### **1.4 Organization of the Study**

This thesis is organized as follows: chapter 2 reviews the related literature of this study in Australia and other countries. Chapter 3 describes the theoretical framework that is used in the current study and the development of hypotheses. Chapter 4 explains the research design and method being used in this study whilst data analysis and discussion of statistical results are presented in chapter 5. Conclusions, findings and limitations of this study are stated in chapter 6. This chapter also provides suggestions for future research.

## **Chapter 2**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

Public awareness of environmental matters has increased demand for information from firms with respect to their environmental activities. This has resulted in a number of studies in this area. In prior studies, various theoretical frameworks have been used to explain the incidence of corporate environmental and social disclosure. These are legitimacy theory or social contract theory (Ramanathan, 1976; Shocker and Sethi, 1974), positive accounting theory (Watts and Zimmerman, 1986) and stakeholder theory (Ullmann, 1985) and these theories have been empirically tested (Guthrie and Parker, 1989; Gray et al., 1991; Patten, 1992; Ness and Mirza, 1991; Belkaoui and Karpik, 1989; Deegan and Gordon, 1994; Blacconiere and Patten, 1994; R. W. Roberts, 1992). The results of the studies are presented in this chapter.

#### **2.2 Studies in Australia**

##### **2.2.1 Social and Environmental Disclosure**

The tendency of companies to voluntarily report social and environmental information in their annual report has been of interest to researchers for a considerable period of time. Various approaches and methods have been undertaken to understand reporting practice of corporate social and environmental information. Table 2.1 summarises prior studies carried out in Australia.

**Table 2.1**  
**Social and Environmental Disclosure**

Researcher(s)	Information Type	Research Method	Major Findings
Trotman (1979)	Social Responsibility Disclosure	<p>Data source: 1967, 1972 and 1977 annual reports.</p> <p>Sample of the 100 largest companies. Six major groups of disclosure were included: environment, energy, human resources, product, community involvement and other.</p> <p>The disclosure was distinguished into four categories: monetary and non-monetary quantification, monetary quantification, non-monetary quantification, and non-quantitative information.</p> <p>The amount of disclosure was measured by the number of pages.</p>	<p>The amount of social responsibility disclosure increased during the periods studied.</p> <p>There was an increase in the number of companies providing quantified social responsibility information from 13 in 1967, to 19 in 1972 and to 33 in 1977.</p> <p>Thirty-five companies made some environmental disclosure and the kinds of the disclosure varied widely. Ten firms made disclosures in relation to energy, thirty-five firms made some disclosure on staff training and twenty-six firms made disclosure in relation to safety and welfare of employees.</p> <p>The rationales for this increase were, first, to contribute to a good public image; second, to develop a sign of good management; and third, to achieve an annual report awards.</p>
Pang (1982)	Social Responsibility Disclosure	<p>Data source: 1980 annual reports.</p> <p>Sample was the first 70 largest firms and a further 30 listed firms were selected at random.</p> <p>Social disclosures were grouped into five major areas: energy, environment, community involvement, human resources,</p>	<p>The incidence of companies disclosing social disclosure had increased. The proportion of companies disclosing social responsibility was highest for the companies with market capitalisation \$500 million or above. Thirty-six out of seventy-nine firms disclosed quantified information, monetary and non-monetary terms.</p>

**Table 2.1 (Continued)**  
**Social and Environmental Disclosure**

Researcher(s)	Information Type	Research Method	Major Findings
		<p>products and consumer issues. Each firm was classified according to the most prominent industrial activity in which it was engaged.</p>	<p>The largest firms used monetary and non-monetary methods of disclosure. Several of the companies devoted a separate section of their annual report to social responsibility matters. Generally, larger firms tended to provide separate disclosure of their social activities than the smaller firms. Human resources was the most popular disclosure. The other two areas more often reported were community involvement and environment. Oil and mining, manufacturing, building and engineering companies provided the greatest number of disclosures on energy and environmental matters.</p>
<p>Guthrie and Parker (1989)</p>	<p>Corporate social reporting</p>	<p>Data source: A 100-year (1885-1985) study of annual and half-yearly reports (total of 177 reports). Sample was a steel company (BHP). Social disclosure consisted of six themes: environment, energy, community involvement, product safety, human resources and others. The number of pages was used to measure the level of disclosure. Statistics: scatterplots.</p>	<p>Total social disclosure over the period studied varied greatly. Human resources and community involvement were the predominant disclosures. Corporate reports were found to exhibit a variable pattern of total social disclosure levels over the history. Disclosures did not appear to be made as a consistent reaction to economic, social or political conditions or events. The results failed to confirm legitimacy theory.</p>

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**Table 2.1 (Continued)**  
**Social and Environmental Disclosure**

Researcher(s)	Information Type	Research Method	Major Findings
Tilt (1994)	Influence of pressure groups on Corporate Social Disclosure.	Data sources: annual report, booklets or leaflets, advertisement labelling of products, and supplements to annual report. Sample was 59 of 146 social organizations throughout Australia (46.8% response rate), excluded highly specific interests (i.e. geologists, bird-watchers). A pilot study was undertaken to test the accuracy of the questionnaire. The impact of the significant number of environmental groups than other groups, was statistically tested. Statistical tests: Mann-Whitney U test, Fisher's Exact Probability test, Cochran's Q test, Chi-square, Kendall's Tau test, and Kruskal-Wallis H test.	Pressure groups had definite viewpoints about corporate social disclosure. Disclosure of descriptive and quantifiable information was necessary and annual reports was preferred place for the disclosure. Social information in a supplement to annual report received the second highest score for understanding (after advertisement) and the second highest score for credibility (after annual reports). The type of disclosure with the highest considered credibility was the annual report. It was perceived that legislation or standards were needed to ensure that companies were disclosing information about their activities that affected society. Almost all pressure groups attempted to influence companies; however, neither confrontational view nor the co-operational view emerged as predominant.
Gibson and O'Donovan (1994)	Environmental disclosure and regulations development.	Data source: a ten-year (1983-1992) study of annual reports. Sample of 41 listed companies. The reports were grouped on an industry basis, and 8 industry groups were identified: chemicals, oil and gas, paper & packaging,	The number of companies reporting environmental information had increased from 46% in 1983 to over 67% in 1992. The number of companies reporting financial, non-financial and descriptive environmental information had increased during the periods studied.

**Table 2.1 (Continued)**  
**Social and Environmental Disclosure**

Researcher(s)	Information Type	Research Method	Major Findings
		<p>engineering, transport, mining, solid fuels and miscellaneous. Types of environmental information were classified into financial information, non-financial information, descriptive information and total environmental information.</p> <p>The amount of disclosure was calculated by the number of pages.</p>	<p>Each industry group showed a marked average percentage increase in the amount of total environmental disclosure.</p> <p>Chemical, engineering, solid fuels, paper and packaging, oil and gas, and mining industries recorded the largest increase in environmental disclosure. However, the disclosures in mining industry group were almost exclusively descriptive. It was difficult to link between increased environmental content in annual reports and increased environmental legislation because there was no uniform environmental regulation applicable to publicly listed companies.</p>
Gowland (1995)	Accounting and legal implications in the restoration of mine sites	<p>The sample was 46 publicly listed mining firms (13% of the total Australian listed mining population) selected from the Jobson's mining year book for 1991/1992.</p> <p>Questionnaires were distributed to exploration and extractive companies.</p> <p>Statistical test chi-square</p>	<p>More than 50% of the sample nominated legislation affecting them in respect of restoration.</p> <p>Extractive companies restored mine sites on completion of or during mining activities, while exploration companies were not subject to restoration requirements.</p> <p>Fourteen extractive companies employed full-time environmental officers. The majority of companies believed that consumer was ultimately responsible for funding the restoration of the environment.</p> <p>Income tax and assessment act (ITAA) discou-</p>

**Table 2.1 (Continued)**  
**Social and Environmental Disclosure**

Researcher(s)	Information Type	Research Method	Major Findings
			raged expenses on mining restoration. The tendency to report mine site restoration had grown and it was envisaged disclosure of contingent liabilities would grow in the future.



Trotman (1979) examined voluntary social responsibility disclosure made by the 100 largest Australian listed companies according to their market capitalisation. The survey compared the disclosures made in 1977 annual reports with disclosures in 1972 and 1967. The extent of social disclosure was measured by the number of pages devoted to six major social responsibility areas: environment, energy, human resources, products, community involvement and other. Types of information being disclosed were divided into four groups: monetary and non-monetary disclosure; monetary disclosure; non-monetary disclosure; and non-quantitative disclosure.

It was found that the extent of social disclosure had substantially increased during the periods surveyed. The number of companies providing quantified social responsibility information had increased from 13 in 1967 to 33 in 1977. Thirty-five per cent of the sample provided disclosure on environmental activities but in general qualitative terms.

Trotman (1979) argued that there were several reasons for the increased disclosure. First, social responsibility reporting was used to develop a good public image. Second, corporate social responsibility could also be a sign of good management. Third, community pressure could exert influence upon social responsibility reporting. Finally, achieving annual report awards could be another incentive of firms to voluntarily disclose social information.

A follow up study was made by Pang (1982). Pang examined the 70 largest firms by their market capitalisation and a further 30 firms randomly selected from the remaining firms listed on the Sydney Stock Exchange. The purpose was to analyse the types of disclosure by industry classification. Disclosure of social information was made up of five major groups: environment,

energy, human resources, community involvement, products and consumer issues but Pang did not mention about measurement of disclosure.

The findings demonstrated results similar to those of Trotman (1979) that the practice of social responsibility reporting had grown. There was an indication that different industries had positive associations with specific groups of information being disclosed. For example, manufacturing, oil and mining companies tend to voluntarily disclose environmental information.

Guthrie and Parker (1989) undertook a historical study of corporate social reporting in Australia's largest steel company, Broken Hill Proprietary Company Ltd. They examined the annual reports for 100 years from 1885-1985. The level of disclosure was measured by the number of pages devoted to six areas: environment, energy, product safety, community involvement, human resources and others. Guthrie and Parker posited that corporate social disclosure was a reaction to environmental factors in order to legitimise company actions.

They found that social disclosure over the period studied varied significantly. Human resources and community involvement were primary information provided in the annual reports. The environmental disclosure commenced in 1970 but it was somewhat patchy and marginally supported legitimacy theory. Based on the overall social disclosures, the results suggested that the legitimacy theory was not adequate as a means of explaining corporate social disclosure during the period studied.

Tilt (1994) surveyed the influence of pressure groups towards social responsibility reporting. Data was obtained from annual reports, booklets or leaflets, advertisement, and supplemental reporting. The study sampled 59 out of 146 social organisations.

It appeared that pressure groups in Australia exerted, directly or indirectly, influences over social responsibility disclosure and approximately 81 per cent of the groups were environmental groups. Furthermore, it was asserted that pressure groups were likely to lobby with companies and government; however, their perceptions toward reporting of social and environmental responsibility were indeterminate. Tilt concluded that the pressure groups perceived the social disclosure in the annual report was the most reliable information.

Research that focuses on environmental matters was undertaken by Gibson and O'Donovan (1994) and Gowland (1995). The earlier researchers looked at the relationship between environmental disclosure and the development of environmental legislation whilst the latter researcher surveyed the accounting and legal implications in the restoration of mine sites.

Gibson and O'Donovan (1994), in their ten-year longitudinal study, examined 405 annual reports of 41 Australian publicly listed companies. The annual reports were then grouped into 8 industries. The amount of disclosure was calculated by the number of pages. Gibson and O'Donovan noted that attachment to the environmental legislation could result in a variety of costs. This resulted from diverse national environmental regulations applicable throughout Australia.

However, it was found that the trend of companies to voluntarily disclose environmental information indicated an increasing pattern with an irregular upward trend. Mining companies increased their environmental disclosures approximately 1% when disclosures in 1983 were compared with 1992. The peak disclosure occurred in 1991. Also, the environmental information was descriptive. It appeared there was a tendency for disclosures to be associated with movements in the economic indicators. Gibson and O'Donovan conjectured there may be a negative association between company profitability and the degree of environmental responsibility disclosure, but they did not test this assumption.

Gowland (1995) included 13% of the total population (at the time of study there were 350 mining companies) in his study. Mining companies have to incur considerable costs to restore mine sites and legislation affects them with respect to this restoration. However, Gowland noted that 61% of the respondents did not believe that mining companies had to restore mine sites. This implied that mining companies were reluctant to restore mine sites, but legislation inevitably forced the companies to become involved in such restoration. Gowland predicted there would be an emerging need to disclose contingent liabilities in relation to future expenditures or compensation.

In summary, corporate environmental disclosure has been investigated as a subset of social disclosure as well as a single set of environmental disclosure and indicated that the amount of disclosure increased across the studies. Various methods have been used to measure the degree of the disclosure but most of the previous studies applied a single method in one study. However, the studies did not observe a firm's incentives to do voluntary disclosure.

## 2.2.2 Determinants of Voluntary Disclosure

There are various firm motives to voluntarily disclose information regarding social and environmental activities. Research indicates that firm characteristics play an important role on the extent of the disclosure. Table 2.2 presents a summary of prior studies in Australia on the incentives of voluntary social and environmental disclosure.

Trotman and Bradley (1981) examined voluntary social disclosure made by the 207 largest Australian listed companies according to their market capitalisation. The objective was to examine whether the extent of corporate social responsibility disclosure made in the 1979 annual reports could be explained by four selected firm-specific characteristics. The extent of disclosure was measured by the number of lines. Trotman and Bradley used total assets as a proxy of firm size, beta for systematic risk, social pressure and management's decision horizon.

The results indicated that size, social pressure and management's horizon were positively correlated to the level of social disclosure. The relationship between systematic risk and the level of disclosure was not significant.

Kelly (1981) surveyed fifty companies over the period 1969-1978 and classified them into three groups: primary, secondary and tertiary industries and treated this classification as one of three explanatory variables. The classification followed that of the Australian Associated Stock Exchange (AASX). Kelly also included time horizon and the report recipient. The level of disclosure was measured by a dichotomous index based on the presence of the selected disclosure items.

**Table 2.2**

**Determinants of Voluntary Disclosure: Australia**

Researcher(s)	Variables	Research Method	Major Findings
Trotman & Bradley (1981)	Firm size * Systematic risk Social pressures* Management's decision horizon*	Data source : 1979 annual reports. Sample of 207 large firms listed on the Australian Associated Stock Exchange. Line-by-line measure method Statistics: chi-square, Mann-Whitney, Spearman Rank Correlations	Firms that made corporate social responsibility (CSR) were, on average, larger in size had a higher systematic risk, and placed stronger emphasis on long term decisions. Positive association was found between CSR and firm size, the extent of social pressures faced by the company, and the emphasis the company placed on the long-term in making decisions.
Kelly (1981)	Time horizon Report recipients* Nature of industry	Data source: annual reports 1969-1978. Sample of 50 listed firms Dichotomy approach Statistics: Chi-square, Spearman Rank Correlations	Level of environmental disclosure had increased over the period studied. Larger corporations tended to disclose more environmental information than the smaller firms. Primary and secondary firms tended to disclose more environmental information than tertiary firms.

\* positive and significant variable

**Table 2.2 (Continued)**

**Determinants of Voluntary Disclosure: Australia**

Researcher(s)	Variables	Research Method	Major Findings
Deegan and Gordon(1994)	Environmental sensitivity * Positive environmental disclosures Negative environmental disclosure	Data source: 1991 annual reports. Sample of 197 firms. Environmental groups were asked to rate environmental sensitivity of an industry. Developed formulas to measure environmental sensitivity index. The extent of disclosure was measured as the average number of words. Three hypotheses were tested in the study. Statistical tests: Pearson product moment correlation, t-test, Wilcoxon matched pairs test, and Spearman's rank order.	The magnitude of environmental sensitivity of the firm within which that company operates was significantly and positively associated with the amount of positive environmental disclosure. The extent of positive environmental information disclosed was significantly greater than the amount of negative information. Management behaved opportunistically in its disclosure of environmental information.

\* positive and significant variable

Voluntary social disclosure in the annual report increased during the periods studied. Firms in primary and secondary industries tended to disclose more environmental information than those in tertiary industries. Also, with respect to firm size in terms of the number of report recipients, larger firms tended to disclose more environmental information than smaller firms. Kelly concluded that social responsibility disclosure had increased over the period studied. Kelly noted that the disclosure of corporate social responsibility information suggested the increasing importance in information content of annual reports.

Deegan and Gordon (1994), using political cost theory, investigated the propensity of corporate environmental disclosure in 197 firms 1991 annual reports in the AGSM Annual Report File. The disclosures were categorised into positive and negative disclosure. Positive disclosures were defined as disclosures of "information which presents the company as operating in harmony with the environment" (p. 6) and negative disclosures described as "disclosures that present the company as operating to the detriment of the environment" (p. 8). The amount of disclosure was calculated on the basis of the number of words.

Instead of using firm size, Deegan and Gordon argued that environmental sensitivity of an industry may become a predominant factor determining a decision to make disclosures of environmental information. Nevertheless, firm size was still included in the study as an additional test to see its effect on the amount of positive environmental disclosures. Three testable hypotheses were developed on the basis of environmental sensitivity and the nature of environmental disclosures being made.



Statistical results of Pearson product-moment correlation and Spearman correlation rank order strongly supported the hypotheses. There was a significant difference in the magnitude of positive and negative environmental disclosures made by Australian listed companies. In addition, environmentally sensitive firms, particularly large firms, tended to voluntarily disclose positive environmental information in their annual reports. Deegan and Gordon concluded that voluntary environmental disclosures were undertaken opportunistically by management to reduce political costs they may have.

### 2.2.3 Summary

A number of empirical studies have been undertaken in Australia to investigate social and environmental disclosure. A few of the studies examined management's incentives to voluntarily disclose social and environmental information in their annual report. It appears that corporate characteristics influence management's decision to voluntarily disclose such information. In addition, pressure groups seek the adequacy of social and environmental information in the annual report and exert influence upon the extent of the disclosure. Environmentally sensitive firms tend to disclose environmental information in order to mitigate the imposition of political costs.

## 2.3 Studies in Overseas Countries

Extensive research on social and environmental disclosure has been conducted in overseas countries, particularly in the United States. This

section explores the previous studies in which the discussions are grouped into three subsections: studies on determinants of voluntary disclosure, environmental disclosure and environmental performance, financial performance and social and environmental performance.

### **2.3.1 Determinants of Voluntary Disclosure**

Table 2.3 summarizes prior studies on the determinants of voluntary social and environmental disclosure in overseas countries. The majority of the studies focused on the quantity of overall corporate social responsibility disclosures. Cowen et al. (1987) and Maheshwari (1992) examined the relationship between individual corporate characteristics and the type of social responsibility disclosure measured on the basis of the number of pages. Cowen et al.'s (1987) study was undertaken in the United States and Maheshwari (1992) in India.

In these two studies, seven specific types of social disclosure were adopted and related to company size, industry classification, profitability and the presence of a social responsibility committee. Cowen et al. (1987) classified the disclosure of environmental information into four groups: (1) pollution control; (2) prevention or repair of environmental damage; (3) conservation of natural resources; and (4) other environmental disclosures.

Cowen et al. (1987) performed OLS multiple regression for total disclosures and for each category of disclosure against the independent variables. Size was the strongest explanatory variable both for total disclosure and for each type of disclosure. Cowen et al. also noted that type of disclosure did not directly relate to whether an industry has "high or low profile"

**Table 2.3**

**Determinants of Voluntary Disclosure: Overseas**

Researcher(s)	Variables	Research Method	Major Findings
Cowen et al. (1987)	Firm size * Nature of industry * Profitability (ROE) Social Responsibility Committee *	Data source: Ernst &Whinney 1978 survey. Sample of 134 US firms from various industries. The degree of disclosure was measured by the number of pages method Seven areas of disclosure: energy, product, environment, human resources, community involvement, fair business practices, and other. Statistics: descriptive tests, OLS multiple regression.	Firm size had a significant impact on environmental, energy, fair business practices, community involvement, and other disclosures being made. Industry category appeared to have influenced some types of CSR (e.g. energy). The existence of a Social Responsibility committee appeared to correlate with disclosure of human resources. The conclusions drawn in this study related to the number of disclosures, not to the level of corporate social activity.
Belkaoui & Karpik (1989)	Stock price return Systematic risk * Leverage # Profitability (ROA) Firm size * Capital intensity Dividends-retained	Data source: survey of Ernst & Ernst 1973 and Business and Society Review. Sample of 23 US firms. Reputational index for social performance and social disclosure was scaled varying	There was a significant and positive association between social disclosure and social performance. There was a significant and positive association between social disclosure and political visibility (measured by size and systematic risk).

\* positive and significant variable  
# negative and significant variable

Table 2.3 (Continued)

Determinants of Voluntary Disclosure: Overseas

Researcher(s)	Variables	Research Method	Major Findings
	earning ratio # Social performance *	from 0 to 13. Independent variables were grouped into monitoring and contracting costs (leverage, dividends-retained earnings ratio), political visibility (size, capital intensity, systematic risk), and economic performance (ROA, stock price return). Statistics: plots, OLS multiple regression, normality, Shapiro-Wilks test, ridge regression.	There was a significant negative association between social disclosure and financial performance. There was an insignificant and negative correlation, yet positive pairwise correlation, between economic performance and social disclosure. This may be a result of the presence of multicollinearity.
Ness and Mirza (1991)	Nature of industry *	Data source: annual reports for 1984. Sample was the top 131 UK companies from 6 industries. The companies were reclassified into two groups: oil industry and other industry. Four groups of disclosure were reclassified into environment-related and other disclosure.	There was a positive association between environment-related disclosure and the oil industry. The environment-related disclosure tended to be concerned with favourable social performance rather than with activities detrimental to the environment. 91% of the disclosure was descriptive and 9% was non-financially quantified. Disclosure was not financially quantified.

\* positive and significant variable  
 # negative and significant variable

**Table 2.3 (Continued)**

**Determinants of Voluntary Disclosure: Overseas**

Researcher(s)	Variables	Research Method	Major Findings
R. W. Roberts (1992)	Stakeholder power (ownership#, leverage*, political action com- mittee *) Strategic posture (public affairs* & philanthropic foundation*) Economic perfor- mance (systematic risk#, return on equity*). Control variables (firm size, age*, and industry classification*)	Using dichotomous index. Analysing with agency theory framework. Statistical tests: Pearson's chi- square, Yates' corrected chi- square and cross-product ratio.  Data source: annual reports for periods of 1984-1986. Sample was 130 US firms from 7 industries. Used stakeholder theoretical framework. Statistics: chi-square, logistic multiple regression.	Based on agency theory, it was concluded that environmental disclosure was undertaken to increase the welfare of management.  Stakeholder power, strategic posture, and economic performance were significantly related to the levels of corporate social disclosures. Corporations confronted with a high level of political exposure were more likely to disclose social responsibility activities. Social responsibility disclosure was perceived by management as a way to meet certain creditor expectations. Widespread stock ownership did not increase corporate incentives to make social responsibility disclosures. Corporations exhibiting relatively strong economic performance in prior periods,

\* positive and significant variable  
 # negative and significant variable

**Table 2.3 (Continued)**

**Determinants of Voluntary Disclosure: Overseas**

Researcher(s)	Variables	Research Method	Major Findings
Maheshwari (1992)	Firm size * Type of industry * Profitability (ROA) Social Responsibility Committee *	Data source: annual reports and Economic Times annual survey. Sample was 100 Indian firms from ten industries. The level of disclosure was measured by the number of pages. Total and subtotal disclosures were regressed against the independent variables. Statistics: descriptive tests, OLS multiple regression.	<p>were more likely to have high current levels of social disclosure. Companies with less stable patterns of stock market return were relatively less likely to commit resources to social activities.</p> <p>Corporate age and industry classification that may act as intervening variables regarding social responsibility activities were supported.</p> <p>Firm size was a significant explanatory variable associated with types of social disclosure. The presence of Social Responsibility committee strongly related to human resources disclosures. Nature of industry related to disclosures of energy, environment, and community involvement.</p>

\* positive and significant variable  
# negative and significant variable

environmental impact. They argued that a company may be engaged highly in social responsibility activities, but did not disclose such activities in its annual report. Otherwise, some companies might be involved in relatively trivial activities, but make considerable disclosures. This finding led them to conclude that ". . . discussing social responsibility disclosures as a total group may be disguising some very important differences in their treatment by corporations" (p.118-120).

Maheshwari (1992) replicated the study of Cowen et al. (1987) but with different measures for profitability and firm size. Fortune rank was used by Cowen et al. as a surrogate of size, whereas Maheshwari used net assets as a measure of size. Cowen et al. measured profitability by return on equity (ROE) whilst Maheshwari adopted return on assets (ROA). Although firm size and profitability were measured differently the studies produced similar results. Firm size was a significant positive variable and profitability had a negative correlation to the extent of social disclosure.

Belkaoui and Karpik (1989) investigated factors influencing management's decision to disclose social responsibility information. Using a positive accounting framework, they examined the relationship of two variables, social performance and economic performance, to social disclosure. The explanatory variables (operating leverage, systematic risk, stock price return, profitability, firm size, capital intensity, dividend-retained earnings ratio and social performance) were grouped into four categories: (1) social performance; (2) financial performance; (3) political visibility; and (4) economic performance. The extent of social disclosure was measured using a social disclosure scale derived from the Ernst and Ernst (1973) survey. The scale varied from 0 to 13. Social performance was measured on the basis of a

reputational index developed by Business and Society Review and a sample of 23 US firms was used in this study.

The results indicated that social disclosures were positively associated with social performance and political visibility. A significant negative association was found between social disclosure and financial performance, but social disclosure had no association with economic performance. Belkaoui and Karpik suspected that these findings resulted from the presence of multicollinearity between economic performance variables.

Ness and Mirza (1991) examined environment-related disclosure for the oil industry. They reviewed the 1984 annual reports of the top 131 companies in the UK according to sales turnover. The companies were taken from six industry groups (capital goods, consumer goods [durable], consumer goods [non-durable], commodity group, oil and miscellaneous) listed in Times 1,000 Largest UK Industrial companies (1984-1985). They reclassified the industries into two groups: oil industry and other industries. Four areas of disclosure (product-related, employee-related, environment-related and community-related) were reclassified into environment-related and other disclosures. Ness and Mirza found a positive relationship between environment-related disclosure and the oil industry. The disclosure tended to be concerned with favourable social performance rather than with activities detrimental to the environment. Using agency theory, they concluded that environment-related disclosures were undertaken to increase the welfare of management.

R. W. Roberts (1992) focused on the examination of economic performance in prior periods to the extent of social disclosures. The degree of social disclosure was based on the rankings of the Council on Economic Priorities



(CEP) report, however, he did not disaggregate the disclosures into specific groups. ROE was positively associated with the extent of social disclosure, which was contrary to the finding of Cowen et al. (1987). A possible explanation for these different results is that they sampled from different time periods, used a different proxy of ROE, and different measures of the amount of disclosure. Roberts noted that economic performance in prior periods was associated with current levels of social disclosure. Thus, there was a strong indication that a time period of financial and economic performance could affect the level of disclosure. The study also supported the application of the stakeholder model developed by Ullmann (1985) to corporate social responsibility disclosure.

### 2.3.2 Environmental Disclosure and Environmental Performance

The relationship between environmental disclosure and environmental performance was examined by Wiseman (1982), Rockness (1985), and Freedman and Wasley (1990). Environmental performance was defined as a firm's actual environmental performance compiled by the Council on Priorities (CEP). The basic premise underlining their studies is that the extent of environmental disclosure could reflect company environmental performance. Table 2.4 presents a condensed summary on this research.

Wiseman (1982) investigated the practice of environmental reporting made by 26 US firms from three environmentally sensitive industries. The degree of voluntary environmental disclosure was measured by the specificity of information items. A score of "three" was assigned to monetary or quantitative disclosure items; "two" for non-quantitative disclosure items; "one" for general disclosure items; and "zero" for the absence of disclosure.

**Table 2.4****Environmental Disclosure and Performance**

Researcher(s)	Sample	Research Method	Major Findings
Wiseman (1982)	26 US firms from environmentally sensitive industries: steel, oil, pulp and paper.	Data source: 1972-76 reports of CEP (Council on Economic Priorities). Developed indexing method on the basis of the specificity of information and line-by-line. Information items were selected through a review of the environmental reporting literature. The index was made up of four different groups: monetary, non-quantitative, general terms and no disclosure. There were 18 items included in the index. Statistical test: Spearman's Rank Order Correlation.	Voluntary environmental reports were inconsistent, providing inadequate disclosure for most of the environmental performance item included in the index. No relationship existed between the content of firms' environmental disclosures and firms' environmental performance. The usefulness of environmental reports contained within the corporate annual report for inter-company performance comparisons was questionable. The length of environmental disclosure did not represent better environmental performance.
Rockness (1985)	26 US firms from four industries: steel, oil, electric utilities and pulp and paper	Data source: annual reports between 1972 and 1976. Experimental study involving financial analysts, members of environmental institutions,	Environmental disclosures made in firms' annual reports were sufficient for users with diverse backgrounds to form consistent comparative evaluations of firms' environmental performance within industry.

**Table 2.4 (Continued)**

**Environmental Disclosure and Performance**

Researcher(s)	Sample	Research Method	Major Findings
		<p>regulators and MBA students.                      Total of subjects was 128.                      A group of subjects was randomly assigned to assess one of the four industries. Each group comprised 32 subjects.                      Firms' environmental disclosures were abstracted and no name and address of the firms.                      Subjects were instructed to rank overall environmental disclosure as the best to worst environmental performance.                      Statistical tests: Kendall's Coefficient Concordance, Kendall's W, Spearman's Rho, Spearman's Rank Order Correlation.</p>	<p>These evaluations were inaccurate interpretations of actual performance. Subject rankings of environmental performance were rarely associated with the corresponding the CEP rankings of actual performance.                      Need for environmental reporting requirements should be explored.</p>

Table 2.4 (Continued)

Environmental Disclosure and Performance

Researcher(s)	Sample	Research Method	Major Findings
Freedman and Wasley (1990)	50 US firms from four environment-sensitive industries.	Data source: 10K reports and annual reports in 1972-1976. Adopted indexing procedures as used by Wiseman (1982). Information items and classifications were similar to Wiseman's. Statistical test: Spearman's Rank Order Correlation.	Neither voluntary annual report environmental disclosures nor mandatory 10K environmental disclosures were indicative of actual firm environmental performance. Firms in oil industry with better environmental performance more extensively described their past and future expenditures for pollution abatement. The findings suggested the need to regulate voluntary annual report disclosures made by firms, and/or the need for the SEC to improve its mandatory environmental disclosure requirement.

The length of voluntary environmental disclosure did not describe better environmental performance of firms. Wiseman concluded that no relationship existed between the content of a firm's environmental disclosure and corporate environmental performance. Quality of the disclosure could not be linked to the length of the disclosure. The voluntary environmental disclosures were incomplete, providing inadequate disclosure for most of the environmental performance items included in the index.

Subsequently, Rockness (1985) assessed the relationship of environmental performance and environmental disclosure in an experimental setting. Financial analysts, environmental groups, regulators, and MBA students were asked to make comparative judgments about performance based on environmental disclosures abstracted from corporate annual reports. The disclosure sheets for firms were arranged in random order according to each industry. Each industry group was evaluated by 32 subjects, eight from each subject group. Subjects ranked the corporate disclosures into three equal piles: best environmental performance, average, and the worst environmental performance. Within each pile, the subjects were asked to sort the disclosures from the best to the worst in environmental performance.

Subjects with similar backgrounds and areas of expertise made similar comparative judgments about corporate environmental performance from environmental disclosures. Kendall's Coefficient of Concordance and Kendall's W were used to test agreement among the subject in each group. It was concluded that subjects with different backgrounds and attitudes toward environmental performance interpreted corporate environmental performance in the same manner from the disclosures. In general, the

results indicated there were no significant differences between subject groups on evaluations of environmental performance. Rockness concluded that environmental disclosures made in the annual reports were adequate for users with diverse backgrounds to form consistent comparative evaluations of corporate environmental performance within industry. However, subjects' rankings of environmental performance were rarely associated with the corresponding CEP rankings of actual performance.

Freedman and Wasley (1990) conducted a follow-up study extending the studies of Wiseman (1982) and Rockness (1985) by investigating the association between environmental performance and environmental disclosure made in annual reports and 10 Ks. This results indicated that mandatory environmental disclosures, as made in 10Ks, did not appear to be more significant to actual environmental performance than voluntary disclosures made in the annual reports. In other words, environmental disclosures, mandatory and voluntary, do not reflect actual environmental activities of the companies. This may lead potential users of environmental reporting to ignore this information. Consequently, Freedman and Wasley suggested the need to regulate environmental disclosure in the annual report.

### **2.3.3 Financial Performance and Social and Environmental Performance**

The relationship between financial performance and social and environmental performance has also been investigated. A review of prior studies on this area is summarized and presented in Table 2.5.

**Table 2.5**

**Financial Performance and Environmental Performance**

Researcher(s)	Variables	Research Method	Major Findings
McGuire et al. (1988)	ROA * Total assets * Operating income growth # Sales growth Asset growth Debt to assets # Operating leverage * Systematic risk # Total return Risk-adjusted return Standard deviation of total return # Standard deviation of operating income	Data source: Fortune's annual survey for the period 1983-1985. and COMPUSTAT. Social Performance was taken from corporate reputations released in Fortune magazine. Sample was 131 US firms. Reliability and validity of the data were evaluated. Data on accounting- and stock-market-based measures and risk were obtained from COMPUSTAT: period of 1977-1981, 1983-1985, and 1982-1984. Statistical test: univariate (correlation test) and multivariate (stepwise multiple regression).	There was little contemporaneous association between corporate social performance and and stock-market-based measures. There was a positive association between ROA and corporate social performance supporting the view that financial performance affected social responsibility. The accounting- and stock-market-based risk measures tended to be negatively associated with social responsibility. The ratio of debt to assets had a significant negative association with corporate social responsibility. Corporate social responsibility was negatively associated with the ratio of debt to assets, beta and the standard deviation of total return and positively associated with operating leverage in prior period. These suggested that low-risk firms and firms with a high return on assets would be better able to afford to act in a socially responsible manner.

\* positive and significant variable  
 # negative and significant variable

33

**Table 2.5 (Continued)**  
**Financial Performance and Environmental Performance**

Researcher(s)	Variables	Research Method	Major Findings
			Measures of risk explained a significant portion of the variability in social responsibility across firms. Accounting-based measures, particularly ROA, proved to be better predictors of corporate social responsibility than market measures. Prior financial and economic performance was generally a better predictor of corporate social responsibility than subsequent performance.
Jaggi and Freedman (1992)	Net income # Return on assets # Return on equity # Cashflow/assets # Cashflow/equity # Systematic risk # Price/earnings ratio #	Data source: 1978 pollution reports and COMPUSTAT tape. Sample was 13 US pulp and paper firms. Pollution index was developed based on Cannon (1974) and Freedman and Jaggi (1986). The variables were grouped into economic and market performance. Statistic tests: Pearson correlation and Spearman rank order.	There was a negative association between pollution performance and economic performance over a short period of time, but this association had opposite direction during the period after the reporting year particularly for ROA and ROE indicators. The market reacted differently to pollution performance in terms of systematic risk and price/earnings ratio. Firms with higher risk had better pollution performance but investors valued these firms lower.

\* positive and significant variable  
 # negative and significant variable



McGuire et al. (1988) investigated 131 US firms to test the relationship between corporate social responsibility and firm financial performance by considering time periods of corporate financial performance. Financial performance measures were classified into accounting-based performance and market-based performance measures. Accounting-based performance measures consisted of ROA, average assets, operating income growth, sales growth, asset growth, debt to assets ratio, operating leverage and standard deviation of operating income. Market-based performance was measured by risk-adjusted return, total return, systematic risk and standard deviation of total return. It was hypothesised that prior, concurrent, and subsequent financial performance was associated with corporate social responsibility. Corporate social responsibility was defined as corporate reputations released by Fortune magazine.

The results showed that accounting-based measures (ROA, total assets, sales growth, asset growth, and operating income growth) were better predictors of social responsibility than market-based measures (risk-adjusted return and total return). Also, prior financial performance was a better predictor of corporate social responsibility than subsequent financial performance. McGuire et al. perceived that the association between concurrent social responsibility and financial performance may partially be artifacts of prior high financial performance. Therefore, McGuire et al. suggested that future research should consider the influence of prior firm financial performance on corporate social performance.

Jaggi and Freedman (1992) examined the impact of pollution performance on economic and market performance. They undertook a cross-sectional study of 13 US pulp and paper firms. Pollution data was extracted from pollution reports filed by firms with the EPA whilst economic and market

performance data were taken from the COMPUSTAT tapes. Economic performance variables were net income, return on equity (ROE), ROA, cash flow/equity, and cash flow/assets. Market performance variables were systematic risk and the price/earnings ratio. Jaggi and Freedman developed two hypotheses to examine the short-term effects of pollution performance on prior, current and subsequent years of economic and market performance.

They reported a significant negative association between current pollution performance and current economic performance in the years preceding economic performance, but this association was positive in the period after the reporting year for ROA and ROE indicators. In addition, market performance indicators indicated negative correlation coefficients. Better pollution performance was associated with higher risk and investors valued these firms lower.

A considerable number of studies have investigated whether social and environmental disclosure have information content, and whether investors or stock markets react to social and environmental disclosure (e.g., Alexander and Bucholz, 1978; Ingram, 1978; Spicer, 1978; Anderson and Frankle, 1980; Belkaoui, 1980; Ingram and Frazier, 1980; Shane and Spicer, 1983; Mahapatra, 1984; Freedman and Jaggi, 1986; Patten, 1990; Freedman and Stagliano, 1991; Epstein and Freedman, 1994; Blacconiere and Patten, 1994). These empirical studies have not been reviewed because they are not directly relevant to the current study.

### **2.3.4 Summary**

There are various firm-specific characteristics which influence the extent of social and environmental disclosure. Different proxies of profitability and firm size have resulted in mixed findings. The relationship between both corporate social and environmental performance and corporate financial and economic performance in different time periods has also been tested and found to be associated.

### **2.4 International Comparative Studies**

Social and environmental initiatives in the business community are growing, especially in developed countries, which has drawn the attention of researchers to examine if there is a diversity of social and environmental responsibility reporting among these countries. A summary of literature review on international comparative research in this area is provided in Table 2.6.

Guthrie and Parker (1990) examined corporate annual reports in the US, UK and Australia and used the origins of companies as an independent variable. A sample of the 147 largest companies by their market capitalisation from all three countries were selected. Four testable dimensions were developed based on theme, evidence, amount and location of the disclosure in the annual report. Two theoretical frameworks, user utility and political economy theory, were adopted to analyse the practice of social and environmental disclosure in those countries.

Based on a user utility, which considered the effectiveness of disclosures to communicate with and to meet various interest groups, Guthrie and Parker

**Table 2.6**

**International Comparative Studies**

Researcher(s)	Variable	Method	Major Findings
Guthrie and Parker (1990)	Theme, amount, evidence, location, and total of disclosure	<p>Data source: the 1983 annual reports.</p> <p>Sample was 147 largest listed firms from 4 countries. The origins of firms were used as an independent variable.</p> <p>Theoretical frameworks of user utility and political economy were used to explain the data.</p> <p>Three countries included in the study were Australia, UK, and US.</p> <p>Five null hypotheses were developed for the study.</p> <p>Statistical test: chi-square.</p>	<p>There was a significant difference between countries and their disclosure of social information.</p> <p>There was a significant difference in the method of social disclosures existed between countries.</p> <p>There was a significant difference with respect to the location of social disclosure for the three countries.</p> <p>There was no significant difference with respect to amount of disclosure between the countries surveyed.</p> <p>All 3 countries adopted a common ranking for the importance of disclosures on human resources, environment, and community involvement.</p> <p>A sizeable proportion of corporate social disclosure appeared to be made re-actively rather than pro-actively.</p>

**Table 2.6 (Continued)**  
**International Comparative Studies**

Researcher(s)	Variable	Method	Major Findings
C. B. Roberts (1991)	Germany, Netherlands, France, Sweden and Switzerland.	Data source: the 1988 and 1989 annual reports. Sample was 110 companies. Only companies with English language reports were included in the sample. 54 specific environmental items were classified into 9 types of information. Statistical test: ANOVA.	<p>The levels of disclosure were viewed as testament to the perceived importance attached by social, political, and economic interest groups to the disclosure of non-market impact of corporate activity.</p> <p>The majority of firms disclosed at least some environmental information; however, the level of disclosure was generally low. On average, companies disclosed less environmental information than employee-related information. Environmental disclosure practice did not generally appear to follow country-specific patterns. There appeared to be relatively few consistent differences in terms of the number of items disclosed.</p>

found significant differences in the disclosure of social information in terms of method and location of the disclosure. Compared to other countries, Australia had a relatively low rate of corporate social disclosure. The disclosure in Australia predominantly contained human resource information. Most of the disclosure was primarily in non-monetary terms and located in a variety of non-specific sections in corporate annual reports.

According to the political economy perspective, it was found that social disclosure was made reactively rather than proactively. This disclosure was used to demonstrate a constructive response to public expectations or to avoid further regulation of the disclosure. Thus, corporate social and environmental disclosure were made "to sustain and legitimise existing economic and political structures in the business and wider communities" (p. 171). Guthrie and Parker further noted that social disclosure was viewed to reflect public social priorities, response to government pressure, accommodate environmental pressures and project corporate image.

The growing environmental concern in European countries stimulated C. B. Roberts (1991) to investigate practices of environmental disclosure in mainland European countries with respect to the overall level of disclosure and nine specific groups of environmental information being disclosed. A sample of 110 companies was selected from five countries: France, Germany, the Netherlands, Sweden and Switzerland.

The incidence of environmental disclosure did not follow country-specific patterns. This meant that environmental reporting among countries being observed followed general or common patterns. However, there were few consistent differences in terms of the number of environmental items being disclosed. German firms disclosed the highest amount of environmental

information. However, disclosure of the majority of companies in the sample was generally low.

## **2.5. Conclusion**

The results of the studies reported here indicate that corporate social and environmental disclosure has increased over the last two decades. The studies also appear to lend support to the contention that there is an association between corporate characteristics and voluntary social and environmental disclosure. However these studies do possess certain shortcomings. The extent of voluntary disclosure was not measured by an unweighted and weighted index simultaneously. Neither were alternative indices measured against categories of voluntary environmental disclosure variables. Further, the effect of alternative time periods of economic performance was not considered.

The methodology employed in the current study is designed to overcome the shortcomings mentioned. Three different indices, word index, unweighted index and weighted index, are simultaneously applied to categories of voluntary environmental disclosure. The inclusion of prior and current year of economic performance variables is considered. Also other variables which have not been previously tested (market capitalisation, the membership of the Australian Mining Industry Council (AMIC) and commercial production), are included in the current study. Explanations of the selected corporate characteristics and theoretical framework that will be applied in this study are presented in chapter 3. Hypotheses development is also discussed in this chapter.

## Chapter 3

### THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

#### 3.1 Introduction

The discussion in chapter 2 indicates that various corporate characteristics are associated with the level of voluntary environmental and social disclosures.

In this chapter, stakeholder theoretical framework, which is used in the current study, is elaborated. The stakeholder theory looks at the environmental disclosure from the perspective of corporate management to strategically maintain the corporation's continued existence (Gray et al., 1995). The reason for choosing this theoretical framework is that stakeholder theory provides a coherent conceptual framework to an organization "to manage the relationships with its specific stakeholder groups in an action-oriented way" (Freeman, 1984, p. 53). Companies are developing new modes of cooperation with their various stakeholders to attain a sustainable corporation (Elkington, 1994). Thus, this theory can help explain the growing environmental actions of the companies.

This chapter describes the incidence of environmental disclosure in relation to the dimensions of stakeholder theory and discusses explanatory variables used in this study within the stakeholder dimensions. This chapter first discusses the concept of stakeholder theory as proposed by Ullmann (1985). The next section will elaborate on the independent variables used in this study associated with the theory, whilst the last section will conclude with discussion of this chapter.



## **3.2 Stakeholder Theory**

### **3.2.1 Stakeholders**

Stakeholders are defined as "groups and individuals who can affect and are affected by the achievement of an organization's mission" (Freeman, 1984, p. 38). Stakeholders can be varied, but, in general, they consist of government, regulatory bodies, customers, shareholders, accounting profession, environmental groups, and financial institutions. Disclosure of environmental information is used to communicate with a company's stakeholders (Dierkes and Anthal, 1985) to foster mutual partnerships towards a "greening" world (Mastrandonas and Strife, 1992).

Each stakeholder may be interested in different types of environmental information and seeks the information from reports made by the company or external organizations (Shane and Spicer, 1983; Mastrandonas and Strife, 1992; Epstein and Freedman, 1994). However, environmental information in the annual report is the major source used by a wide range of users (C. Roberts, 1992). In addition to making financial and investment decisions, stakeholders use the information to assess a corporate's activities toward environmental objectives and the effects of such activities on corporate wealth (Cowe, 1992), and corporate growth and profitability (Greeno and Robinson, 1992). Thus, there is a need for the environmental information by stakeholders in the company.

In managing environmental activities and in order to keep in balance responses to stakeholders, management attempts to satisfy nontraditional stakeholder demands for environmental information so as to achieve its objectives (Thompson et al., 1991; R. W. Roberts, 1992). Furthermore R. W.

Roberts argued that a successful company must consider the differential power of each stakeholder on resource allocations. The next section discusses the dimensions in the stakeholder theory.

### **3.2.2 Stakeholder Model**

The stakeholder model developed by Ullmann (1985) consists of three dimensions: stakeholder power, strategic posture, and economic performance. The incidence of environmental disclosure can be approached by these three dimensions of the stakeholder theory.

The stakeholder power is defined as the willingness of a firm to respond to the intensity of stakeholder demands (R. W. Roberts, 1992). Strategic posture, in relation to environmental reporting, is the response mode of a company's management concerning environmental demands (Ullmann, 1985). Economic performance, in the past and current period, is a significant factor to develop an environmentally responsible action as this action incurs considerable costs. Further explanation on these dimensions is provided in the next section. Also, the explanatory variables used in the current study are discussed in this section and hypotheses are developed.

### **3.3 Hypotheses Development**

Eleven independent variables are selected to represent the three dimensions of the stakeholder theory. These variables are ownership, political pressure, operating leverage (as proxies of stakeholder power), the presence of corporate environmental committee (as a proxy of strategic posture), return

on assets, return on equity, and systematic risk (as proxies of economic performance), firm size, capital intensity, independent auditor and commercial production (as control variables).

### **3.3.1 Stakeholder Power**

A stakeholder has differential power dependent on the degree of control over resources required by the company (Ullmann, 1985). The more critical the stakeholder resources, the greater the willingness of the company to satisfy the stakeholder demands. As environmental activities absorb considerably an entity's resources, stakeholders demand information about environmental responsibility activities if the activities have financial implications. Also, as environmental matters has heightened public attention, the company responds it by developing an environmentally responsible action and produces information about its activities on the environment. Therefore, the company is willing to disclose these activities in annual report.

Empirical evidence suggests that environmental responsibility activities and disclosures are useful in developing and maintaining good relationships with stakeholders (Gibson and O'Donovan, 1994; Mastrandonas and Strife, 1992). Under this model, a positive correlation between stakeholder power and environmental disclosure is expected. Several proxies can be used to represent stakeholder power: ownership, leverage, political pressure. Justifications for developing hypotheses on these variables are provided below.

### 3.3.1.1 Ownership Diffusion

Knowledgeable investors may consider corporate environmental responsibility activities in making their investment decisions because environmental expenditures can reduce surplus (earnings) available for owners (Cooper, 1988). The adequacy and appropriateness of particular environmental expenditures is critical. For example, information relating to penalty and capital expenditure were the most frequently demanded by investors (Mastrandonas and Strife, 1992).

Research on the relationship between ownership and corporate social and environmental disclosure has produced mixed results. As a consequence of the Exxon Valdez accident, firms that affiliated with Alyeska Pipeline Service company (as a proxy of ownership) increasingly disclosed environmental information (Patten, 1992). In contrast, R. W. Roberts (1992) found that ownership diffusion, i.e., 5% or more of outstanding ordinary shares held by management or other individuals, was not a significant predictor for the degree of corporate social responsibility disclosures.

Craswell and Taylor (1992) found that the concentration of ownership in a firm explained the extent of additional information voluntarily provided by a firm, such as environmental information, in its annual report. Dispersed ownership, particularly environmentally concerned investors, will force management to report environmental responsibility activities (Ullmann, 1985). Therefore, it is predicted that firms widely held by shareholders are more likely to voluntarily disclose environmental information in their annual report than firms closely held by shareholders. The relationship between ownership and the dependent variable is stated in hypothesis H1:

**H1:** The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is negatively related to ownership diffusion.

In this study, ownership is described as a percentage of outstanding ordinary shares owned by the top twenty shareholders.

### **3.3.1.2 Operating Leverage**

Leverage can capture the importance of creditors as stakeholders in a firm's wealth. Creditors and financial lending institutions may share in potential liabilities if their loans are secured by contaminated properties (Davey, 1994; Williams and Phillips, 1994). As a result, they may demand additional information in order to assess the probability of a firm meeting their debt obligations. There are conflicts of interest related to environmental liabilities and the incentives of management to report these liabilities because disclosure of potential environmental liabilities may be perceived as an admission of guilt (Cerf, 1993). This implies that disclosure of environmental responsibility should be linked to loans approval. If creditors are concerned with environmental responsibility activities, the company is more likely to disclose its environmental activities.

Research on the relationship between leverage and corporate social responsibility has produced conflicting results. Belkaoui and Karpik (1989) and McGuire et al. (1988) reported a significant negative association between operating leverage (a ratio of total debt to total assets) and the level of social disclosure and social performance. On the other hand, R. W. Roberts (1992) employed a different measure and found that the financial leverage (a ratio

of total debt to total equity) has a positive relationship with social responsibility disclosure.

Considering those empirical findings and the contention that creditors' influences should be managed (R. W. Roberts, 1992), it is expected that firms with high leverage will have a greater creditor's influence. Therefore, highly levered firms are likely to disclose more environmental information in their annual reports compared to firms with low leverage. The reason is that creditors can force firms to provide information about environment-related activities. Hypothesis H2 is expressed as follows:

H2: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to operating leverage.

Operating leverage is measured as a ratio of total debt to total assets as used by Belkaoui and Karpik (1989) and McGuire et al. (1988). Previous empirical research also indicates that time period of leverage has an effect on the level of environmental disclosure. McGuire et al. (1988) suggested consideration of time period of financial performance (e.g., leverage) in conducting a corporate environmental responsibility study. They argued that it is worthy to consider prior financial performance as an explanatory variable influencing corporate social responsibility rather than concurrent or subsequent financial performance. This implies that there may be different effects of prior and current leverage on the extent of environmental disclosure. Therefore, as this study also takes account of different time period of leverage, hypothesis H2 can be specified further into the following forms:

H21: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to operating leverage in the previous year.

H22: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to operating leverage in the current year.

### 3.3.1.3 Political Pressure

Mineral mining companies may bear political constraints. These pressures stem from international as well as national legislation. At an international level, firms that are operating in overseas countries, particularly in developing countries, have to comply with the requirements of the United Nations, the World Bank and the International Finance Corporation (O'Neill, 1993) in addition to related-country regulations. At a national level, the Australian government has placed strict regulations on the environment at Federal, State and local government levels (Australian Mining Industry Council [AMIC], 1993b; Gibson and O'Donovan, 1994). For example, New South Wales requires 50 permits, whereas Northern Territory requires 600 permits for new mining companies (Gomez, 1992). Uncompetitive taxation, land access restriction, legislative processes and inefficient bureaucracy are other major deterrents to mining industry (Rydge's, 1986; Champion de Crespigny, 1994). These are perceived as governmental intrusions that adversely affect a firm's value (R. W. Roberts, 1992). A company may collaborate with other mining companies in the same industry to bargain or lobby with government in order to reduce those intrusions.

Bell and Warhurst (1993) concluded that large firms associated with the Business Council of Australia (BCA) tend to be more politically active, in terms of dealing with political environment and the level of relationship to government, than non-member firms. This finding is commensurate with US studies, where a number of firms have become increasingly involved in a political action committee to affect political decision making (Keim and Baysinger, 1988). Furthermore, R. W. Roberts (1992) pointed out that "[h]igher levels of perceived governmental influence on corporate activity would be expected to lead to a greater effort by management to meet expectations of government". (p. 602)

The development of strategic corporate reporting can be used to reduce the perceived political pressure or governmental influence (Huizing and Dekker, 1992). As government may introduce political constraints by requiring firms to address the perceived environmental problems, the firms disclose information about environmental program and policy in their annual report explaining that they comply with environmental standard and regulations.

Membership of the AMIC is selected as a proxy of political constraints. There are two reasons why AMIC membership is chosen; first, despite the existence of many sub-mining organizations, the Council represents the majority of mining firms which operate throughout Australia. Second, the Council seems to be more politically powerful than other mining organizations to negotiate or lobby with government and environmental groups because the mining industry is fundamental to Australia's economic development (AMIC, 1994; Barnett, 1994). Third, the AMIC develops and proposes environmental objectives and standards to government in which these standards must be adopted by the members.



Different pressures of government on corporate environmental responsibility may lead to differential disclosure patterns across companies. The provision of environmental disclosure is viewed as a reactive response to social pressures (Guthrie and Parker, 1990). As the activities of mining companies are susceptible to detriment of the environment, the AMIC members may develop together a strategy and policy to restore the environment including the provision of environmental report. It is assumed that firms which are members of the AMIC are likely to disclose environmental information to reduce political constraints or political actions undertaken by government and pressure groups because they are more informed than non-AMIC companies. Therefore, it is predicted that there is likely to be an association between membership of the AMIC and corporate environmental disclosure. Hypothesis H3 is formulated as follows:

H3: The voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is likely to be related to the membership of the AMIC.

### **3.3.2 Strategic Posture**

The strategic posture of the firm can be passive or active. Active strategic posture means that a firm is performing environmental activities proactively to address stakeholder influences, for example, by establishing a special department or committee, which is responsible for preparing and developing programs, policies and strategies relating to environmental matters. Passive strategic posture means that a firm does not develop a specific policy or program to address the existing environmental issues.

Strategic posture of a company is positively associated with the extent of disclosure. Stakeholder theory posits that the more active the strategic posture, the more likely a company is to carry out environmental activities and disclosures.

### **3.3.2.1 The presence of an Environmental Responsibility Committee**

Bowman and Haire (1975) investigated the strategic posture of firms related to corporate social responsibility. Ullmann (1985) distinguished a firm's strategic posture as either active or passive. A firm has an active strategic posture if corporate management develops a specific department dealing with environmental matters to address its stakeholder influences. If corporate management does not set up specific programs and monitor its relation to stakeholders, this is perceived as a passive strategic posture.

Empirical evidence suggests that the presence of a social responsibility committee could explain the extent of social disclosure (Cowen et al., 1987; Maheshwari, 1992). Similarly, the existence of a corporate environmental responsibility committee can describe the strategy of a company in addressing environmental issues. In essence, the presence of an environmental responsibility committee is used to influence stakeholders through environmental responsibility activities. Therefore, the presence of an Environmental Committee is selected as a proxy of a firm's strategic posture.

Companies that have an environmental responsibility committee and mention it in the annual report are perceived to have an active strategic posture. If companies do not mention it in their annual report, they are

deemed to have a passive strategic posture. It is posited that companies that provide an environmental responsibility committee are more likely to disclose environmental activities. Thus, there is a positive relation between the presence of an environmental committee and voluntary environmental disclosure in an entity's annual report. Hypothesis H4 is stated as follows:

H4: The voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is likely to be related to the presence of an environmental responsibility committee.

### 3.3.3 Economic Performance

The third dimension concerns the past and current economic performance of the firm. As dealing with environmental matters involves considerable funds, economic performance will directly affect a firm's financial capability to set up environmental programs. For example, in the United States, environmental expenditures can reach as high as \$46 billion per year or 2% of sales (Greeno and Robinson, 1992) or 25% to 60% of earnings (Mastrandonas and Strife, 1992) and these costs are likely to increase in the years to come.

It is believed that economic performance and environmental responsibility activities are related (Bowman and Haire, 1975; Spicer, 1978) and they are inseparable components of sustainable development (AMIC, 1993a; Bebbington, 1993; Batley and Tozer, 1993). Therefore, it is expected the more favourable the economic performance of a firm, the more likely it is to engage in environmental activities and disclosures. In contrast, financially

distressed firms may not be likely to engage in environmental activities and, therefore, they may have less disclosures. Profitability and systematic risk, as measures of economic performance, are perceived as causal factors that allow management to undertake more extensive environmental responsibility programs (R. W. Roberts, 1992). The reason is that acceptable levels of economic performance are necessary to meet environmental demands from stakeholders (Ullmann, 1985). Proxies of economic performance used in the current study are return on assets, return on equity and systematic risk.

### **3.3.3.1 Return on assets (ROA)**

ROA has been used as a measure of economic performance in prior studies and has resulted in conflicting findings. For example, Belkaoui and Karpik (1989) reported that ROA had a negative association with corporate social disclosure. Also, Jaggi and Freedman (1992) reported a negative association with corporate environmental performance. However, Belkaoui and Karpik suspected the existence of multicollinearity between leverage and systematic risk caused this result. In contrast, McGuire et al. (1988) found that ROA, particularly in prior period, had a positive relationship with corporate social performance.

It is predicted that companies that have larger ROA are likely to disclose more environmental information in their annual reports. The reasons are that, first, those companies want to demonstrate the superior skill of the management keeping the firm profitable whilst achieving environmental responsiveness (Bowman and Haire, 1976; Alexander and Bucholz, 1978). Second, with a greater ROA, companies can achieve economic efficiency

whilst protecting and improving the environment (Miller, 1992). Management may have to replace old and inefficient capital with new, environment-friendly and efficient capital to obtain positive economic effects (Freedman and Jaggi, 1994) which will have beneficial implications for stakeholders (Greeno and Robinson, 1992). If a company adopts environmentally sensitive technology and equipment, it is likely the company to disclose it in the annual report.

Even though environmental activities involve a considerable outlay of funds, larger firms tend to have better environmental performance as well as economic performance (Chen and Metcalf, 1980). Therefore, this study predicts that firms with higher ROA are likely to voluntarily disclose more environmental responsibility activities in their annual report than firms with small ROA. Hypothesis H5 is formulated as follows:

H5: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to ROA.

Gibson and O'Donovan (1994) contended that the time period of profitability can affect the tendency of corporate environmental disclosure. Empirical evidence suggests that firms with high ROA in the prior period are better able to afford to act in an environmentally responsible manner (McGuire et al., 1988). This study includes different time periods of ROA to examine whether prior and current year ROA is associated with the extent of voluntary environmental disclosure. In relation to this, the aforementioned hypothesis can be expressed in two forms:

H51: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the ROA in the prior year.

H52: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the ROA in the current year.

### 3.3.3.2 Return on equity (ROE)

Another measure of economic performance is ROE. Prior empirical studies demonstrate conflicting results. The findings of certain studies indicate a positive association between ROE and social and environmental responsibility disclosure (Spicer, 1978; Mills and Gardner, 1984; R. W. Roberts, 1992) whereas the findings of other studies suggest a negative association with social and environmental performance (Bowman and Haire, 1975; Jaggi and Freedman, 1992). This implies that companies tend to have environmentally responsible activities but they are contingent upon their financial profiles (Mills and Gardner, 1984).

It is perceived that meeting environmental responsibility goals is a secondary objective because an acceptable level of economic performance is necessary prior to devoting resources for environmental activities (Ullmann, 1985; R. W. Roberts, 1992). Therefore, this study predicts that firms with larger ROE are likely to voluntarily disclose more environmental information. Hypothesis H6 is expressed as follows:

**H6:** The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the ROE.

R. W. Roberts (1992) indicated that a time dimension of ROE appears to have effects on the level of environmental disclosure. More importantly, he concluded that strong ROE in the prior period is positively associated with current levels of social disclosure. However, he did not examine the relationship of current ROE and current social disclosure to check the association. This study takes account of that association and therefore the above hypothesis can be specified into two forms:

**H61:** The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the ROE in the prior year.

**H62:** The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the ROE in the current year.

### **3.3.3.3 Systematic Risk**

Systematic risk is defined as the contribution of the individual security to portfolio risk. Previous empirical studies have tested the association between systematic risk and corporate social and environmental disclosure (Spicer, 1978; Anderson and Frankle, 1980; Trotman and Bradley, 1981; Belkaoui and Karpik, 1989; Freedman and Stagliano, 1981; R. W. Roberts, 1992) and with social and environmental performance (Mahapatra, 1984;

McGuire et al., 1988; Jaggi and Freedman, 1992). There is a belief that corporate management reduces risk by undertaking social disclosure (Trotman and Bradley, 1981) in order to have more stable patterns of stock market returns (McGuire et al., 1988; R. W. Roberts, 1992).

It is argued that firms with high systematic risk are relatively less likely to afford to act in an environmentally responsible manner (Jaggi and Freedman, 1992) than firms with lower risk. Moreover, Spicer (1978) concluded that companies with better pollution-control records had lower total risk and systematic risk than less environmentally responsible firms. McGuire et al. (1988) concluded "reduction of firm risk as an important benefit of social responsibility" (p. 869). Therefore, in this study, it is expected that systematic risk will have a negative relation to corporate environmental disclosure. Hypothesis H7 is expressed as follows:

H7: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is negatively related to the systematic risk.

Empirical evidence shows that alternative beta estimation techniques could act differently in a variety of markets (Luoma et al., 1994). Two types of beta (Ordinary Least Square [OLS] and Scholes-Williams [S-W]) are taken into account in this study as separate variables to examine their effect on the level of disclosure. The reason is that OLS does not consider thin trading phenomenon in both stock and market index whilst S-W will assist in estimating beta in the presence of the thin trading phenomena (Australian Graduate School of Management [AGSM], 1993b). The above hypothesis can be stated in two forms:



H71: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is negatively related to the systematic risk measured by OLS beta.

H72: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is negatively related to the systematic risk measured by S-W beta.

### 3.3.4 Control Variables

The four variables of size, capital intensity, commercial production and independent auditor, are considered as control variables because they may intervene other variables and therefore they should be controlled (Ullmann, 1985; Cowen et al., 1987; Belkaoui and Karpik, 1989; R. W. Roberts, 1992). R. W. Roberts further noted that they may also represent some aspects of stakeholder power, strategic posture and economic performance.

#### 3.3.4.1 Company size

Company size has been shown in previous research to have explanatory power to the extent of social and environmental disclosure. However, variable size is associated with environmentally sensitive industries and cannot be generalised to industries which are not environmentally sensitive (Deegan and Gordon, 1994). Chen and Metcalf (1980) concluded that size, as a background factor, influenced the association of corporate environmental activities and financial indicators.

There are two rationales for selecting firm size as an independent variable. First, larger companies are more likely to have greater political visibility or political costs (Watts and Zimmerman, 1986; Deegan and Carroll, 1993) and they produce environmental disclosure to mitigate political costs (Deegan and Gordon, 1994) or political visibility (Belkaoui and Karpik, 1989). Second, larger firms are more likely to have good environmental activities (Spicer, 1978; Chen and Metcalf, 1980).

As mining companies have detrimental effects on the environment (Dierkes and Preston, 1977), large mining firms are likely to be scrutinised by the general public, government, and environmental interest groups. In other words, they have political pressures from public. To avoid claim they are destroying the environment, corporate management tend to develop environmental policies and strategies and disclose them in the annual report. The intention is to show that they do the right thing for the environment in order to achieve a sustainable corporation (Elkington, 1994; Greeno and Robinson, 1992). Consequently, hypothesis H8 is stated as follows:

**H8:** The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to firm size.

This study includes both measures, total sales and total assets, and attempts to examine another measure of firm size, market capitalisation, that has been tested in other accounting research (Wong, 1988). This variable market capitalisation has not previously been used in a published study of social and environmental accounting disclosure. Thus, it may provide further

H81: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the amount of total assets.

H82: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the amount of total sales.

H83: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the amount of market capitalisation.

#### 3.3.4.2 Capital Intensity

Environmental responsiveness of a company requires a large amount of expenditure and investment so it requires excellent skills of management in order to make the firm profitable (Alexander and Bucholz, 1978). In contrast, Vance (1975) revealed that socially responsible firms will be at a competitive disadvantage due to the added expense and investment of being socially responsible.

However, it is perceived that investment in equipment for environmental protection does not always relate to a decrease in environmental damage. This is due to difficulties in differentiating between costs incurred for the equipment and improved environmental performance (Christophe and Bebbington, 1992). Empirical evidence indicates that oil, iron and steel industries spent a considerable amount on pollution control expenditures

both as a portion of capital expenditure and as a portion of operating cash flow (Mahapatra, 1984).

Environmentally friendly equipment and technology are becoming of interest to stakeholders as they protect the environment (Deegan and Gordon, 1994) and provide different claims from stakeholders (Cornell and Shapiro, 1987; McGuire et al, 1988). For example, information relating to environmental expenditures, including capital spending, was ranked as one of the most important needed by investors (Mastrandonas and Strife, 1992). Inevitably, mining companies are required to use environmentally friendly machinery and equipment because "sound environmental practice is cost-effective and, in the long term, enhances a project's capacity to compete globally" (O'Neill, 1993, p. 9). Greeno and Robinson (1992) corroborated, in the long-term, capital investment in innovative systems may increase efficiency and overall profitability.

From the above discussion, it appears that capital intensity could represent some aspects of stakeholder power, strategic posture and economic performance. As capital investment can reflect a firm's orientation on the environment, the firm will disclose its investment policy to show its concerns on the environment. Therefore, it is expected that a positive association exists between capital intensity and the extent of voluntary environmental disclosure. Hypothesis H9 is stated as follows:

H9: The extent of voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is positively related to the capital intensity.

### 3.3.4.3 Independent Auditor

An environmental audit is performed as part of the external financial audit routines due to the growing consciousness of environmental issues (Financial Forum, 1994; Carey, 1992; Phillips, 1992; Gray, 1990). Companies call for environmental auditors to assess the compliance status on the environmental legislation, particularly for environmentally high-risk industries, since they realise the tremendous financial and social impact if they do not comply (Williams and Phillips, 1994; Kestigian, 1991; Maxwell, 1990). In addition, the selection of a qualified auditor, such as one of the big six accounting firms, provides a signal to the market that the information being disclosed is high quality (Titman and Trueman, 1986; Craswell and Taylor, 1992). Therefore, environmental reporting that has been audited becomes an important information source to stakeholders (Mastrandonas and Strife, 1992).

The objective of the environmental audit is to provide information that enables stakeholders to assess a company's environmental performance as well as the corporate achievement to its environmental goals (Mastrandonas and Strife, 1992; Tozer and Mathews, 1994). It is expected that companies audited by a big six accounting firm are more likely to voluntarily disclose environmental information. Hypothesis H10 is stated as follows:

H10: Australian listed mineral mining companies audited by a big six audit firm are more likely to make voluntary environmental disclosure in their annual report.

#### **3.3.4.4 Commercial Production**

It is possible that some mineral mining companies may be merely carrying out exploration and other companies are actively drilling and extracting minerals from the earth. Clearly, extracting companies are more likely to have an adverse effect on the environment. Commercial production means that a company has extracted crude minerals and might need to process them further in order to market the product to customers. Thus, firms that are in commercial production are likely to deplete natural resources and be more detrimental to the environment than non-commercial firms.

This variable has not been tested in prior studies. It is expected in this study that commercial operations are associated with voluntary environmental disclosure. Hypothesis H11 is stated as follows:

H11: The voluntary environmental disclosure in the annual report of Australian listed mineral mining companies is likely to be related to a commercial operation.

### **3.4 Summary**

In this chapter, three dimensions of stakeholder theory, as developed by Ullmann (1985), are elaborated upon to explain the incidence of environmental disclosure. Explanatory variables relevant to this study and the research hypotheses were developed in the framework of the three dimensions of stakeholder theory. The research procedure, variable measurement and data analysis are discussed in the next chapter.

## Chapter 4

### RESEARCH METHOD

#### 4.1 Introduction

The objective of this chapter is to explain the research design and procedures adopted to achieve the purpose of the study. Based on the literature review and stakeholder theoretical framework discussed in chapter 2 and chapter 3 respectively, it is posited that certain firm characteristics will be associated with the extent of voluntary environmental disclosure by Australian listed mineral mining companies in their 1993 annual report.

#### 4.2 Sample Selection

The sample frame of the study is Australian mineral mining companies listed on the Australian Stock Exchange (ASX). The sample was selected from the microfiche Annual Report File of the Australian Graduate School of Management (AGSM) at Edith Cowan University, Churchlands campus library. The AGSM File consists of the top 500 listed companies in Australia by market capitalisation.

The process of selecting the sample was conducted in two phases. First, mineral mining companies listed in the ASX Journal June and December 1993 editions were used as references to determine the sample. Second, firms listed in the ASX Journal were matched with the firms in the AGSM File. The following table describes the number of firms included in the sample.

**Table 4.1**

**Sample of the Study**

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Number of mining firms listed on Australian Stock Exchange	386
Number of firms not listed on the AGSM Annual Report File	<u>251</u>
Number of mining firms listed on the AGSM Annual Report File	135
Number of Oil & Gas firms (excluded)	<u>31</u>
Number of sample firms in the study	104

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The rationale for including mineral mining firms is that these companies are drilling, extracting and depleting natural resources and this may have adverse effects on the environment. Consequently, it is important to investigate the likelihood of the companies to voluntarily disclose environmental activities in their annual report.

To maintain homogeneity in the sample, oil & gas firms were excluded as they are using different equipment and technology. Also, one mineral mining firm that has oil activities (Pancontinental company) was excluded from the sample. The mineral mining firms in the sample are listed in Appendix A.

**4.3 Data Collection**

The 1993 annual reports were used as the source to extract environmental information as they are the latest reports available in the AGSM Annual Report File at the time of the study. The information extracted from the annual reports was noted in a scoring sheet that is provided in Appendix C.



This included environmental disclosure; financial year-end; total sales; total assets; total debt; total plant assets; total ordinary shares; net income before income tax and extraordinary items; net income after income tax and extraordinary items; percentage of ordinary shares held by the top 20 shareholders; auditor name; the presence of corporate environmental committee; and commercial production. The 1992 annual reports were also used to extract data on total assets, total debt, total ordinary shares, net income before income tax and extraordinary items and net income after income tax and extraordinary items.

Beta and market capitalisation were taken from the 1993 Risk Measurement Service (RMS) published quarterly by the AGSM. When data collection was undertaken, the latest publication of the betas was September 1993. Therefore betas for December 1993 were not reflected in the systematic risk of the firms that have December year-end. This would constrain the study particularly in relation to the magnitude of systematic risk for those companies with a December year-end. Table 4.2 provides financial year-end of firms included in the study.

As five companies had financial statements expressed in their home-country currencies, it is necessary to convert them to Australian currency. The Reserve Bank of Australia Bulletin for January 1994 was adopted as a reference in determining the relevant end-of-month exchange rates. This publication is preferred as the Reserve Bank is formally entitled to release exchange rates prevailing throughout Australia. However, as the Reserve Bank Bulletin did not provide all of the required exchange rates, missing rates were obtained from the Australian Financial Review.

**Table 4.2****Firms' Financial Year-End**

Year-End	No. of Companies
January 31	1
March 31	1
May 31	1
June 30	69
July 31	2
December 31	<u>30</u>
Total	104

The 1994 annual report of the Australian Mining Industry Council (AMIC) contained a list of the members of the Council. This report was used to check which firms in the sample are members of the Council.

**4.4 Measures of Voluntary Disclosure: Dependent Variables**

Several different index systems have been adopted in prior studies to measure the extent of voluntary disclosure. These include the number of words (Zeghal and Ahmed, 1990; Deegan and Gordon, 1994), a dichotomous index (Singhvi and Desai, 1971; Kelly, 1981; Cooke, 1989; Ness and Mirza, 1991), the importance of information items (Buzby, 1974; Firth, 1978; Freedman and Jaggi, 1986; Chow and Wong-Boren, 1987; Coy et al., 1993), number of pages (Cowen et al., 1987; Guthrie and Parker, 1989; Maheshwari, 1992; Patten, 1992; Gibson and O'Donovan, 1994), number of lines (Bowman and Haire, 1976; Trotman and Bradley, 1981), number of sentences (Ingram

and Frazier, 1980), and the specificity of items (Wiseman, 1982; Freedman and Wasley, 1990).

In this study, indexing methods using word index, unweighted index and weighted index are applied. It is advisable to undertake weighted and unweighted indices in one study in order to see the effect of the weighting on the ranking of companies (Marston and Shrives, 1991). The following sections outline the indexing procedures applied in the current study.

#### **4.4.1 Identifying Environmental Disclosure Items**

By referring to prior studies (for example, Trotman and Bradley, 1981; Wiseman, 1982; Cowen et al., 1987; Deegan and Gordon, 1994) and a review of a random sample of ten corporate annual reports, a list of 22 environmental items was generated. The checklist was constructed to measure the quantity of non-mandatory environmental information. To ensure the homogeneity of the items (Marston and Shrives, 1991), the 22 items were classified into four categories: corporate environmental policy (7 items), recognition of environmental activities (2 items), prevention or repair of environmental damage (10 items), and environmental liabilities (3 items). A senior academic and an honours student were asked to review the environmental items and their classifications into the four categories. They confirmed the 22 items and their classifications. The environmental items for each category are included in Appendix B.

This checklist was then used to score the items based on three indices. The three indices and the procedure for constructing those indices are discussed

in subsection 4.4.3. The inclusion of three indices allows us to determine which dependent variable best fits the extent of disclosure.

#### **4.4.2 Rating the Importance of Environmental Disclosure Items**

The degree of relative importance of environmental items as rated by financial analysts was used to develop a weighted index. Only one user group, Financial Analysts, was selected because it was impractical to ask the relative importance of environmental information items of all stakeholders. It is noted that "one class of user will attach different weights to an item of disclosure than another class of user" (Cooke, 1989, p. 197). However, financial analysts often use the annual report (Anderson and Epstein, 1995) for making financial assessment, investment decisions and for advising other user groups. For these reasons it is considered that financial analysts are "the most 'sophisticated users' " (Marston and Shrives, 1991, p. 202). Consequently, their views are considered appropriate for the purpose of this study.

The ASX Members' Directory for 1994/1995 was used as a reference to distribute the questionnaires. There are 259 organizations that are members of the ASX and these organizations comprise 87 different securities and stockbroking firms. A questionnaire, consisted of 22 factors and generated on a random factorial design which resulted in 24 models, was sent to all members, addressed to the Research Department of the respondents, with a covering letter and a reply paid envelope. They were asked to score the 22 items such that the overall score for the items equals 100. The questionnaire and the mean values of the weighted scores for each item are presented in Appendix B.

A total of 37 responses were received from the respondents, and 21 replies were usable yielding a 24 percent response rate. One questionnaire was returned unopened and eleven firms sent back unanswered questionnaires. Seven firms returned incomplete or incorrect scores resulting in a total score of more or less than 100. However, three of the questionnaires with a score of greater than 100 (e.g., 103) were weighted to 100 and the remainder were treated as unusable. Mean values of the scores from the financial analysts were calculated and the means were used as the weights of the items for the weighting disclosure index. Fowler (1993) contended that credible statistics results will be obtained if the response rate is not lower than 20 per cent.

The three indices of disclosure included in this study were treated as separate dependent variables to examine which dependent variable best fits the extent of environmental disclosure. The procedure of scoring the disclosures is explained in subsection 4.4.3.

#### 4.4.3 Disclosure Scoring Method

A scoring sheet was prepared which included three indices being applied. In addition to total score, each category of disclosure items is also added to obtain a score for each category of environmental information. A summary of indexing procedures is described in Table 4.3 and the scoring sheet for calculating the indices is provided in Appendix C.

The advantage of an unweighted index is that misranking of disclosure items can be avoided because the items are treated equally (Marston and Shrives, 1991). However, treatment of equal importance regardless of the

quality of each disclosure item is perceived to be a deficiency of this index (Coy et al., 1991).

The benefits of a weighted index are that it identifies items that possess greater usefulness (Freedman and Jaggi, 1986), and that it recognises the relative importance of the items (Coy et al., 1993). Even though the

**Table 4.3**  
**Indexing Procedure**

Method	Procedure
1. Word Index	<ul style="list-style-type: none"> <li>a. Calculate individual words or numbers relevant to the selected environmental items.</li> <li>b. Numbers are converted into words.</li> <li>c. The amount of environmental disclosures (total and subtotals) is additive based on the actual items being disclosed.</li> </ul>
2. Unweighted Index	<ul style="list-style-type: none"> <li>a. Score '1' for the presence of an environmental item and score '0' for the absence.</li> <li>b. Total and subtotal index is calculated as actual disclosures being made.</li> </ul>
3. Weighted Index	<ul style="list-style-type: none"> <li>a. Each item is weighted on the basis of the relative degree of importance.</li> <li>b. The weights of the items is the average scores of all scores given by financial analysts.</li> <li>c. Total and subtotal index score for each company is calculated by summing weights of overall and subgroups actual items being disclosed.</li> </ul>

weighted index has often been used in accounting research, it has some drawbacks. For example, unclear theoretical justification for the weighting, subjective element on weighting system, and attachment of different weights for different users (Freedman and Jaggi, 1986; Marston and Shrives, 1991). To avoid having such shortcomings, Coy et al. (1993) suggested discriminating between poor and excellent disclosure. However, this discrimination is irrelevant because companies that are better at disclosing 'important items' are also better at disclosing 'less important items' (Spero cited in Cooke, 1989 and Marston and Shrives, 1991).

In summary, each index has its strengths and weaknesses to measure the amount and type of disclosure. Different approaches underlying the scoring procedures have implications in calculating the magnitude of disclosure. Unweighted index is more favourable because it is less subjective than others. It is expected the application of different indices in one study would provide evidence as to which index best fits the extent of voluntary environmental disclosure.

#### **4.5 Independent Variables**

Eleven explanatory variables are tested in this study. Hypotheses based on these variables have been discussed and developed in chapter 3. In this section measurement of each variable will be discussed. A summary of the measures is presented in Table 4.4.

##### **(1) Ownership Diffusion (OWN)**

This variable is defined as the percentage of outstanding ordinary shares held by the top 20 shareholders of the firm. This measure is used because it

delineates concentration of the ownership. It differs from the measurement used in earlier studies: oil firms that affiliated with the Alyeska Pipeline Service company (Patten, 1992) and the percentage of ordinary shares owned by management and other individuals (R. W. Roberts, 1992).

## **(2) Operating Leverage (LEV)**

This variable is measured by a variety of methods. Leverage is defined as sales minus variable costs divided by sales minus variable costs minus fixed costs (McGuire et al., 1988), total debt divided by total assets (Belkaoui and Karpik, 1989), and average debt divided by total equity (R. W. Roberts, 1992). In this study, the leverage is calculated as by Belkaoui and Karpik (1989); that is, total debt divided by total assets. Past and current year of leverage are used in this study which is identical with McGuire et al. (1988).

## **(3) Political Pressure (PRES)**

The presence of political pressure has not previously been used to estimate the extent of environmental disclosure. However, it is desirable since environmental disclosure is exercised to reduce political visibility or political costs (Belkaoui and Karpik, 1989; Deegan and Gordon, 1994; Gibson and O'Donovan, 1994). PRES is a dummy variable to describe whether or not the firm is a member of AMIC; score "one" for member firm of the AMIC and "zero" for non-member firm.

## **(4) Environmental Responsibility Committee (ENCO)**

The presence of a corporate environmental responsibility committee (ENCO) is treated as a dummy variable. A score of "one" is awarded to companies that indicate they have a committee and "zero" if they do not mention the existence of an environmental responsibility committee.



**Table 4.4****Variable Definitions**

Variables	Expected sign	Measures
<u>Dependent variables</u>		
1. ENDIS <sub>1</sub> : Word Index	n.a.	Number of Words
2. ENDIS <sub>2</sub> : Unweighted Index	n.a.	1= the presence of environmental disclosure, and 0=otherwise
3. ENDIS <sub>3</sub> : Weighted Index	n.a.	The mean relative importance of environmental information items
<u>Independent Variables</u>		
Stakeholder Power		
1. OWN	( - )	Percentage of ordinary shares held by the top twenty shareholders.
2. LEV	( + )	Total debt to total assets 1992 & 1993.
3. PRES	( + )	Membership of the Australian Mining Industry Council: 1 = member; 0 = non member.
Strategic Posture		
1. ENCO	( + )	The presence of Environmental Responsibility Committee = 1; otherwise = 0.
Economic Performance		
1. ROA	( + )	Net income before tax and extraordinary items to total assets 1992 & 1993.
2. ROE	( + )	Net income after tax and extraordinary items to total ordinary shares 1992 & 1993.
3. RISK	( - )	OLS and S-W Beta of a firm's security.

**Table 4.4 (Continued)****Variable Definitions**

Variables	Expected sign	Measures
<b>Control Variables</b>		
1. SIZE	( + )	Total assets, market capitalisation, and natural log of total sales.
2. CAPINT	( + )	Gross plant assets to total sales 1993.
3. AUD	( + )	The big six accounting firms = 1; non big six accounting firms = 0.
4. COM	( + )	Commercial production = 1; otherwise = 0.

**(5) Return on assets (ROA)**

Consistent with McGuire et al. (1988), Belkaoui and Karpik (1989), Maheshwari (1992), Jaggi and Freedman (1992), the variable ROA is calculated by dividing net income before income tax and extraordinary items by total assets. This measure takes account of prior period (1992) and current period (1993).

**(6) Return on equity (ROE)**

As with Bowman and Haire (1976), Spicer (1978), Cowen et al. (1987), Jaggi and Freedman (1992) and R. W. Roberts (1992), the measure used for ROE is obtained by dividing net income after income tax and extraordinary items by total ordinary shares. Similar to ROA, this measure takes account of prior period (1992) and current period (1993).

**(7) Systematic risk (RISK)**

This variable is defined as the contribution of the individual security to portfolio and is measured by the security's beta. Two types of betas, OLS and S-W, are applied in this study. These measures were quoted from the RMS published by the AGSM edition of September 1993, which was the latest publication available.

**(8) Firm size (SIZE)**

Two measures of SIZE have been used in previous studies in social and environmental disclosure: total assets (Spicer, 1978; Trotman and Bradley, 1981; Maheshwari, 1992 ) and total sales (Belkaoui and Karpik, 1989; R. W. Roberts, 1992; Patten, 1992). Those variables have been shown to have significant explanatory power and they will be adopted in this study. However, the natural log of total sales is considered in this study because total sales has a non-linear relation to the extent of environmental disclosure. Market capitalisation is also included as an additional measure of SIZE.

**(9) Capital Intensity (CAPINT)**

CAPINT is measured by the ratio of gross plant assets to total sales. This is consistent with the measure used by Soliman (1989).

**(10) Independent Auditors (AUD)**

AUD is a dummy variable to describe whether the firm is audited by the Big Six accounting firms. Score "one" represents firms that are audited by the Big Six accounting firms and score "zero" for firms that are not.

### **(11) Commercial Production (COM)**

COM represents whether the firm is a commercial operation. Thus, COM is a dummy variable: score "one" for commercial firms and score "zero" for non-commercial firms.

#### **4.6 Data Analysis**

Diverse indices are adopted in this study and each index is treated as a separate dependent variable. Each type of index is applied to measure the extent of total voluntary environmental disclosure and four categories of voluntary environmental disclosure.

Different measures for RISK (OLS and S-W) and SIZE (total assets,  $\ln$  total sales, and market capitalisation) are taken separately into regression models. In addition, LEV, ROA and ROE in two periods (1992 and 1993) are included to see the effect of those variables on the extent of disclosure.

Univariate analysis is not performed in the current study. Data analysis is undertaken by using multiple regression analysis. The reason is that an independent variable found to be significant in univariate analysis might become insignificant when combined with other variables in multivariate analysis due to interactions between the variables in the multiple regression model (Pokorny, 1991, p.126). Therefore, even though the hypotheses developed could be tested by univariate analysis, this model is unrealistic because it simply takes account of one independent variable (predictor) in the model (Pokorny, 1991, p. 124). Clearly, this study, which includes fifteen dependent variables (total and categories of disclosure) and twelve models of different independent variables, would be inefficient if running univariate statistics. In most instances the prediction of the dependent

variable (e.g., the incidence of environmental disclosure) can be improved by using more than one variable (Doran, 1989, p. 63). Given this, the extent of environmental disclosure could be regarded as a function of several explanatory variables.

Consequently, a multiple regression analysis is chosen for the current study since the voluntary disclosure of environmental activities can be affected by a number of differential factors. The benefits of multiple regression analysis are: (1) to predict a single dependent variable from the knowledge of more than one independent variable; (2) to provide an objective means of assessing the predictive power of explanatory variables; and (3) to improve the prediction of dependent variable (Hair et al., 1995, p. 93, 98). Ordinary least squares (OLS) multiple regression analysis is performed. The reason is that the majority of independent variables (SIZE, ROA, ROE, CAPINT, OWN and LEV) are either ratio or continuous variables and all of the dependent variables are additive. The remaining four variables (ENCO, PRES, AUD and COM) are treated as dummy variables. The multiple regression model is constructed as follows:

$$\begin{aligned} \text{ENDIS (T}_i\text{)} = & \beta_0 + \beta_1 \text{ OWN} + \beta_2 \text{ LEV}_{(y_i)} + \beta_3 \text{ PRES} + \beta_4 \text{ ENCO} + \beta_5 \\ & \text{ROA}_{(y_i)} + \beta_6 \text{ ROE}_{(y_i)} + \beta_7 \text{ RISK}_{(a-b)} + \beta_8 \text{ SIZE}_{(1-3)} + \beta_9 \\ & \text{CAPINT} + \beta_{10} \text{ AUD} + \beta_{11} \text{ COM} + e_i \end{aligned}$$

where

ENDIS (T<sub>i</sub>) is the dependent variable taking total or categories of voluntary environmental disclosure measured by each index

β<sub>0</sub> is a constant value

β<sub>n</sub> represents the coefficient of predictive variables

X<sub>(y<sub>i</sub>)</sub> represents the variable in year 1992 and 1993

X<sub>(a-b)</sub> alternative measures of beta

$X_{(1-3)}$  alternative continuous variables (total assets, total sales and market capitalisation)  
 $e_i$  a residual value

As five independent variables (SIZE, LEV, ROA, ROE and RISK) have alternative measures, they are taken separately into the multiple regression models in order to avoid having multicollinearity. Alternative combinations of these variables result in twelve sets of explanatory variables as presented in Table 4.5. Consequently, there are sixty multiple regression models for each group of dependent variables and a total of 180 models to be examined in this study.

#### 4.7 Summary

In this chapter, sample selection, data collection, definitions of the relevant variables, indexing procedures and statistical method are elaborated. The results are tabulated and discussed in the next chapter. The existing statistical problems from the data and OLS multiple regression analyses will also be discussed in the following chapter.

**Table 4.5.****Alternative Sets of Explanatory Variables****Model 1**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{SqrtOLS} + b_8 \text{LnMARCAP} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 2**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{SqrtOLS} + b_8 \text{LnSALES} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 3**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{SqrtOLS} + b_8 \text{LnASSETS} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 4**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{LnSW} + b_8 \text{LnASSETS} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 5**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{LnSW} + b_8 \text{LnSALES} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 6**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV92} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA92} + b_6 \text{LnROE92} + b_7 \text{LnSW} + b_8 \text{LnMARCAP} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 7**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES} + b_4 \text{ENCO}_i + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{LnSW} + b_8 \text{LnMARCAP} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 8**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{LnSW} + b_8 \text{LnSALES} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 9**

$$\text{ENDIS}(T_i) = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES}_i + b_4 \text{ENCO} + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{LnSW} + b_8 \text{LnASSETS} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Table 4.5 (Continued)**  
**Alternative Sets of Explanatory Variables**

**Model 10**

$$\text{ENDIS (T}_i\text{)} = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES} + b_4 \text{ENCO}_i + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{SqrtOLS} + b_8 \text{LnASSETS} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 11**

$$\text{ENDIS (T}_i\text{)} = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{SqrtOLS} + b_8 \text{LnSALES} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

**Model 12**

$$\text{ENDIS (T}_i\text{)} = b_0 + b_1 \text{SqrtOWN} + b_2 \text{LnLEV93} + b_3 \text{PRES} + b_4 \text{ENCO} + b_5 \text{LnROA93} + b_6 \text{LnROE93} + b_7 \text{SqrtOLS} + b_8 \text{LnMARCAP} + b_9 \text{LnCAPINT} + b_{10} \text{AUD} + b_{11} \text{COM} + e_i$$

- ENDIS (T<sub>i</sub>) = the extent of environmental disclosure for each type of indices
- OWN = the largest percentage of ordinary shares held by the top twenty shareholders
- LEV = total debt/total assets year 1992 and 1993
- PRES = membership of the Australian Mining Industry Council: 1=member, 0=non member
- ENCO = 1=the existence of Corporate Environmental Committee; 0= otherwise
- ROA = net income before income tax and extraordinary items/total assets year 1992 and 1993
- ROE = net income after income tax and extraordinary items/total ordinary shares year 1992 and 1993
- RISK = beta of a firm's security for 1993 in OLS and S-W versions
- SIZE = total assets, natural log of total sales, market capitalization for 1993
- CAPINT = gross plant assets/total sales for 1993
- AUD = 1= the big six accounting firms; 0= non-big accounting firms
- MARCAP = market capitalization
- COM = commercial production



#### 5.1 Introduction

It was cited earlier that the objective of this study is to investigate the relationship of firm-specific characteristics and the extent of voluntary environmental disclosures with respect to total disclosure and categories of voluntary environmental disclosure.

In this context, OLS multiple regression analysis was used to examine the correlations between 12 models of explanatory variables and the extent of corporate voluntary environmental disclosures, either in terms of total or categories, on the basis of three indices. All these tests were run with SPSS Statistical data analysis.

All relevant data have been collected to test the incidence of voluntary environmental disclosure. Thirty-eight firms (37%) from the sample provide no voluntary environmental disclosure. Several firms that made environmental disclosure did not have certain variables: RISK (2 firms), OWN (1 firm), and OWN and RISK (1 firm) and these firms were ignored in the analysis. This resulted in 62 firms which were included in the sample.

This chapter elaborates on the results of statistical analyses that consist of descriptive and multivariate statistics. Statistical problems of the data and their solution are also presented. Finally, a discussion of the results on the extent of disclosure and stakeholder framework are reported in this chapter.

## 5.2 Descriptive Statistics

Initially, descriptive statistics were calculated to examine estimations of central tendency and the distribution of variables for the mean, standard deviation, kurtosis, and skewness. The median value was obtained from the results of one-sample test of Kolmogorov-Smirnov (K-S). Descriptive statistics of raw data for both dependent and independent variables are shown in Table 5.1 and Table 5.2.

According to Pagano (1990, p. 8-9), descriptive statistics merely provide a general description about the observed data. To do further analysis, such as multivariate analysis, it is necessary to examine whether the variables meet the assumptions underlying multivariate analysis; those are normality, linearity, independence of error, non-collinearity and constant variance of the error terms (Hair et al., 1995; Tabachnick and Fidell, 1989). These problems will be discussed further in the next section.

From Table 5.1. and Table 5.2, it is apparent that the raw data for both dependent and independent variables depart from the normal distribution. With the exception of OWN, ROA92, ROA93, and ROE93 that were skewed to the right (negative skewness), the independent variables were significantly skewed to the left (positive skewness). Therefore, the distributions departed from normality.

According to Pokorny (1991, p. 94), the nature of the distribution of independent variables will reflect the nature of error term distribution. In inferential statistics, meeting the normality of error term distribution is

**Table 5.1****Descriptive Statistics: Dependent Variables**

(n=104)

Variables	Raw Data					Transformed Data				
	Mean	Median	SD	Kurtosis	Skewness	Mean	Median	SD	Kurtosis	Skewness
Words1	43.933	0	94.468	8.908	2.913	1.788	1.756	0.500	-0.968	0.039
Words2	7.923	0	24.053	20.483	4.258	1.578	1.568	0.298	-0.124	0.728
Words3	76.260	0	210.104	53.267	6.533	2.073	2.090	0.449	0.649	0.006
Words4	9.000	0	36.703	46.083	6.342	1.619	1.654	0.421	0.000	0.494
Wordstot	137.115	0	317.495	29.801	4.745	2.125	2.111	0.556	-0.408	-0.085
Unwgt1	0.962	0	1.576	2.073	1.733	0.193	0.000	0.271	-0.264	1.068
Unwgt2	0.173	0	0.405	4.072	2.192	0.051	0.000	0.117	2.209	1.959
Unwgt3	1.115	0	1.834	5.533	2.126	0.212	0.000	0.292	-0.466	0.963
Unwgt4	0.125	0	0.332	3.359	2.301	0.038	0.000	0.100	3.3593	2.301
Unwgttot	2.375	0	3.700	3.368	1.887	0.330	0.000	0.393	-0.843	0.761
Wgt1	4.926	0	7.963	1.535	1.622	0.413	0.000	0.543	-1.155	0.737
Wgt2	0.554	0	1.298	4.117	2.202	0.104	0.000	0.238	1.781	1.901
Wgt3	5.487	0	8.896	4.845	1.999	1.097	1.140	0.244	-0.237	0.056
Wgt4	0.576	0	1.486	3.641	2.299	0.097	0.000	0.247	2.951	2.200
Wgttot	11.542	0	17.458	2.610	1.726	0.617	0.000	0.679	-1.507	0.409

Table 5.2.

Descriptive Statistics: Independent Variables

(n=104)

Variables	Raw Data					Transformed Data				
	Mean	Median	SD	Kurtosis	Skewness	Mean	Median	SD	Kurtosis	Skewness
ASSETS	4.07E+08	71820575	1.06E+09	*	5.608	17.997	18.090	2.055	-0.364	0.009
CAPINT	107.291	60.350	210.775	55.889	6.737	4.330	4.418	1.077	1.046	-0.292
LEV92	43.524	32.985	61.813	54.860	6.725	3.308	3.508	1.097	2.117	-1.112
LEV93	45.827	28.375	94.523	56.165	7.059	3.203	3.346	1.135	2.549	-0.730
MARCAP	4.49E+08	90000000	1.20E+09	*	5.262	18.354	18.315	1.804	-0.374	0.156
OLS	1.283	1.200	0.911	9.319	1.596	2.034	2.025	0.219	7.949	0.159
OWN	76.841	79.245	14.776	0.831	-0.859	4.381	4.415	1.654	-0.431	-0.037
ROA92	-7.479	3.225	84.528	73.169	-7.720	6.680	6.670	0.081	51.387	5.456
ROA93	-1.589	2.085	27.617	9.233	-2.540	4.895	4.884	0.176	5.065	1.253
ROE92	30.067	6.890	130.467	19.439	3.082	6.066	6.106	0.208	12.131	-2.144
ROE93	25.647	3.615	95.087	12.288	1.217	5.931	6.002	0.256	14.264	-2.775
SALES	2.32E+08	34782025	6.70E+08	51.708	6.513	17.910	17.790	1.814	-0.286	0.122
S-W	1.572	1.395	1.035	4.286	1.475	1.071	1.063	0.321	1.171	-0.026

\* Figure is not available from the analysis

- AUD Number of Companies audited by one of the big six accounting firms (1) = 83  
Number of Companies not audited by one of the big six accounting firms (0) = 21
- COM Number of Commercial Companies (1) = 104; non-commercial companies (0) = 0
- ENCO Number of Companies have Environmental Committee (1) = 7  
Number of Companies have no Environmental Committee (0) = 97
- PRES Number of Companies member of AMIC (1) = 31  
Number of Companies not member of AMIC (0) = 73

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essential (Hair et al., 1995; Tabachnick and Fidell, 1989). Thus, there is an indication of statistical problems arising in the observed data in this study.

### 5.3 Statistical Problems

Satisfying the five assumptions: normality, linearity, independence of error, non collinearity and constant variance of the error terms, are imperative in multivariate analysis. In addition, outliers (that is extreme values or influential values from observations) must be resolved in order to not influence normality and linearity of the observations (Stevens, 1992, p. 107).

A casewise plot was performed to detect linearity and the presence of outliers in multivariate analysis. It was found that outliers existed in the observed data and that linearity of the residuals was violated.

There are four ways to eliminate outliers; these are, to correct data entry, to specify missing value codes in computer control language, to delete the outliers, and to change the value on variable(s) (Tabachnick and Fidell, 1989). Stevens (1992) suggests to delete some or all of the outliers from the analysis or to adopt robust regression techniques. However, Huber (cited in Stevens, 1992) contends that a robust regression may be less effective if outliers are in the space of the predictors. Data transformations is a favourable way to reduce outliers as well as to improve the analysis (Tabachnick and Fidell, 1989; Stevens, 1992).

Graphical and non-graphical tests can be used to check the normality of the observed data (Stevens, 1992). The graphical test was performed by a normal probability plot and K-S test to examine the normal distribution of each of

the dependent and independent variables. It is argued that, in the non-graphical test, "the combination of using skewness and kurtosis coefficient and the Shapiro-Wilk test were the most powerful in detecting departures from normality" (Stevens, 1992, p. 253). Unfortunately, the Shapiro-Wilk statistics could not be run in this study because it is limited to a sample size not more than 50 (Norusis, 1990, p. 122). Therefore, the K-S test and examination of skewness and kurtosis coefficient were performed to see if the observed data are from a population having the theoretical distribution (Siegel and Castelan, 1988).

An examination of the skewness and kurtosis coefficients and K-S test was done for each of the dependent and independent variables. As noted earlier, all of the dependent and almost all of the independent variables departed from normal distributions. Hair et al. (1995) suggest "if the variations from the normal distribution is sufficiently large, all resulting statistical tests are invalid . . ." (p. 64). Thus, it is necessary to remedy for non-normality by conducting transformation (Tabachnick and Fidell, 1989; Hair et al., 1995).

Similarly, the assumptions relating to homoscedasticity and independence of the error term were violated. Standardized and studentized residuals (through scatterplot and histogram) were performed to detect homoscedasticity of the residuals. Homoscedasticity indicates the constant variance of errors terms of a variable (Hair, et al., 1995; Neter et al., 1990, p. 247-248). The Durbin-Watson test was undertaken to detect the independence of error terms (Neter et al., 1990, p. 248). This is to ascertain if the time dimension of data has impact on the normality of distribution (Norusis, 1990, p. 260). The violation of these assumptions can be overcome by transformation (Stevens, 1992, p. 96).

Collinearity occurs if there is an interrelation between two or more predictor variables. The presence of multicollinearity would cause, to limit size of regression coefficient, the existence of heteroscedasticity, and difficulties in determining the importance of a predictor (Stevens, 1992). This problem will be explained further in subsection 5.5.1.

#### 5.4 Transformation of Data

Transformations were performed for both dependent and independent variables. Table 5.3 describes the transformations undertaken for each variable. From the results of descriptive statistics for the raw data on the dependent and independent variables in Table 5.1 and Table 5.2, it appears that the distributions are not normal. Tabachnick and Fidell (1989) suggest the following:

If the distribution differs moderately from normal, a square root transformation is tried first. If the distribution differs substantially, a log transformation is tried. If the distribution differs severely, the inverse is tried. (p. 84)

As the distributions of the observed data for dependent variables are substantially positive skewed, a logarithm transformation was employed. Prior to the transformations, as a consequence of the presence of a considerable number of zero values in WORDS, UWGT, and WGT, one was added to get a minimum value of one for each variable. The reason is that zero values cannot be transformed by a log, and log one will yield zero. K-S test was run again to examine the normality. The transformation resulted in closer mean and median values, therefore, skewness was reduced

**Table 5.3****Data Transformation**

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Variable	Transformation
<b>Dependent Variables</b>	
Words_1	log 10
Words_2	log 10
Words_3	log 10
Words_4	log 10
Wordstot	log 10
Unwgt_1	log 10
Unwgt_2	log 10
Unwgt_3	log 10
Unwgt_4	log 10
Unwgtot	log 10
Wgt_1	log 10
Wgt_2	log 10
Wgt_3	log 10
Wgt_4	log 10
Wgttot	log 10
<b>Independent Variables</b>	
Capint	natural log
Lev92	natural log
Lev93	natural log
RISK (OLS)	square root
RISK (S-W)	natural log
ROA92	natural log
ROA93	natural log
ROE92	natural log
ROE93	natural log
Assets	natural log
Marcap	natural log
OWN	square root

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significantly and the distributions were closer to normal (see Table 5.1).

All explanatory variables, except for the dummy variables AUD, ENCO, and PRES were transformed. Variable COM was taken out from the analysis because all the companies observed have a commercial operation. From the descriptive analysis of the raw data (Table 5.2.) and the results of the K-S test, it was found that four variables (OWN, ROA92, ROA93 and ROE93) were negatively skewed and the remaining variables were positively skewed. Transformations were performed on the variables depending on the extent and type of skewness.

Before transformation, variables that were observed as having negative values (ROA, ROE, RISK [OLS] and RISK [S-W]) were assigned a minimum value of one because it is not possible to take a log and a square root with a negative score (Tabachnick and Fidell, 1989, p. 85-86). This was done by finding the variable with the largest negative value and then adding one more than the negative value. This procedure yielded a natural logarithmic measure of zero or square root of one (Deegan and Carroll, 1993). A square-root transformation was applied to OWN and RISK (OLS), whilst a natural-logarithm transformation was employed to MARCAP, ASSETS, CAPINT, SALES, ROA, ROE, RISK (S-W), and LEV.

A K-S one-sample test was undertaken again to check the normality of the transformed data and this indicated that the distributions were normal. In addition, there was no outlier found in the predictive models. The results of the descriptive analysis of transformed data for dependent and independent variables are presented in Table 5.1 and Table 5.2.

## 5.5 Results of Multivariate Analysis

### 5.5.1 Test of Multicollinearity

A problem that may arise in multivariate analysis is the presence of multicollinearity. Its existence can create severe constraints on the regression coefficient (Stevens, 1992). More specifically, Pokorny (1991) concluded that multicollinearity affects the variances of parameter estimators that will reduce the precision of these estimators, lower the t-statistics and reduce their statistical significance (p. 148). Thus this problem must be resolved to maintain the quality and stability of the model developed.

The first step in detecting the existence of multicollinearity was to perform Pearson Correlation Matrices for the twelve models of independent variables. Appendix D, which contains correlation matrices of the twelve regression models shown in Table 4.5, indicates the correlations do not contain a harmful level of multicollinearity. The correlation coefficients in the twelve models are less than 0.60.<sup>1</sup>

However, to ensure these results, another test should be performed. Hair et al. (1995) argue that "Lack of any high correlation values does not ensure a lack of collinearity. Collinearity may be due to the combined effect of two or more other independent variables" (p. 127). Tolerance is a good way to assess multicollinearity because it can detect multicollinearity that is caused by the interaction of two or more variables (Brown, 1991, p. 114).

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<sup>1</sup> According to Farrar and Gaulber (1967), harmful multicollinearity is not present until bivariate correlations reach 0.8 or 0.9.

Furthermore, Brown (1991) contends that if tolerance coefficient is nearly zero high collinearity exists, but if the tolerance coefficient approaches one, the chance of multicollinearity is small.

Moreover, multicollinearity can also be detected from the magnitude of variance inflation factor (VIF) for the variables. It is the reciprocal of tolerance (Hair et al., 1995, p. 127; Norusis, 1990, p. 288). Myers (cited in Stevens, 1992) reveals that ". . . [if] any VIF exceeds 10, there is reason for at least some concern; then one should consider deletion or an alternative to least square estimation to combat the problem" (p. 77).

In this study, tolerance test was undertaken for all regression models and the results of this test are tabulated only for models with the highest adjusted  $R^2$  for three indices. It was found that all tolerance coefficients<sup>2</sup> for the explanatory variables are near to one and their VIFs are less than 10. It means that multicollinearity is not present in the multiple regression models developed.

### 5.5.2 Multivariate Statistics

There are 15 different dependent variables with respect to total and categories of disclosure and twelve models of predictors in this study. The combinations of those variables produce one hundred and eighty multiple regression models tested in the study.

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<sup>2</sup> Tolerance levels for total and categories of disclosure indicate there is no coefficient approaching zero. Even though proxies of SIZE, total assets, total sales and market capitalisation, have tolerance coefficients less than 0.5, they do not demonstrate the presence of harmful multicollinearity. In this case, VIF of the variables were examined and the results which are less than 10 confirms the absence of harmful multicollinearity in these models.

Satisfaction of the assumptions underlying the multivariate analysis has been examined and discussed in the previous section. The alternative variations of the twelve sets of predictors have been discussed and tabulated in Table 4.5 and noted with a consecutive number. Predictors in models 1 to 6 include prior year economic performance of companies whilst predictors in models 7 to 12 include current year economic performance.

The complete statistical results of all multiple regression analysis are provided in Appendix E. From these statistical results, the highest adjusted  $R^2$  for total and categories of disclosure based on each indexing method were selected and considered as the "best" model.<sup>2</sup> The selection of the 15 "best" multiple regression models are presented in Table 5.4. To accept the results, variables must have a significance level up to 10%. This is to protect explanatory variables already admitted in the equation that have a significance level higher than 5% but not over 10% (Draper and Smith, 1981).

The following subsections discuss further the statistical results for the "best" multiple regression models based on each indexing method.

#### **5.5.2.1 Word Index**

The statistical results for the five "best" models based on word index are presented in detail in Table 5.5. In this table, total disclosure, category 1, and category 3 are grouped together because they relate to models which contain economic performance variables in the prior year whereas category 2 and category 4 relate to models which contain economic performance variables in the current year.

**Table 5.4****The Best\* Multiple Regression Models for Each Dependent Variable**

Dependent Variables	Type of Disclosure	Type of Model	Adjusted R <sup>2</sup> **
<b>Word Index</b>			
WORDTOT	Total disclosure	Model 5	0.466
WORD-1	Category 1	Model 4	0.509
WORD-2	Category 2	Model 10	0.410
WORD-3	Category 3	Model 3	0.458
WORD-4	Category 4	Model 12	0.115
<b>Unweighted Index</b>			
UWGTOT	Total disclosure	Model 8	0.562
UWGT-1	Category 1	Model 8	0.527
UWGT-2	Category 2	Model 10	0.420
UWGT-3	Category 3	Model 3	0.451
UWGT-4	Category 4	Model 7	0.140
<b>Weighted Index</b>			
WGTOT	Total disclosure	Model 5	0.399
WGT-1	Category 1	Model 5	0.384
WGT-2	Category 2	Model 3	0.292
WGT-3	Category 3	Model 3	0.340
WGT-4	Category 4	Model 7	0.049

\* Best is determined by the highest value for the adjusted R<sup>2</sup>

\*\* One-tailed statistical test

Table 5.5

## Results of OLS Multiple Regression: Word Index\*

Variables	Expected Sign	Total Disclosure				Category 1				Category 3			
		B	Tolerance	T	Prob.	B	Tolerance	T	Prob.	B	Tolerance	T	Prob.
Prior Period													
Ln (ROA92)	+	1.568	0.747	0.373	0.710	-2.698	0.751	-0.805	0.424	6.255	0.741	1.576	0.120
Ln (ROE92)	+	-0.517	0.737	-1.014	0.314	-0.636	0.738	-1.560	0.124	-0.397	0.695	-0.804	0.424
Ln (total sales)	+	0.213	0.444	2.745	0.008	-	-	-	-	-	-	-	-
Ln (total assets)	+	-	-	-	-	0.261	0.446	3.916	0.000	0.259	0.435	3.261	0.002
AUD	+	0.181	0.810	0.646	0.521	-0.084	0.778	-0.369	0.713	-0.061	0.770	-0.228	0.821
Ln (S-W)	-	0.548	0.612	1.381	0.172	0.274	0.655	0.891	0.376	-	-	-	-
Sqrt (OLS)	-	-	-	-	-	-	-	-	-	0.469	0.660	0.859	0.394
Ln (LEV92)	+	0.059	0.717	0.405	0.687	-0.036	0.751	0.315	0.754	0.016	0.721	0.116	0.908
Ln (CAPINT)	+	0.194	0.717	1.886	0.064	0.037	0.674	0.431	0.668	0.134	0.662	1.332	0.187
ENCO	+	0.445	0.899	0.992	0.325	0.666	0.902	1.859	0.068	-0.004	0.912	-0.010	0.992
Sqrt (OWN)	-	-0.050	0.715	-0.706	0.483	-0.046	0.714	-0.812	0.420	-0.043	0.754	-0.666	0.508
PRES	+	0.826	0.575	3.194	0.002	0.503	0.557	2.392	0.020	0.767	0.577	3.157	0.002
Constant	n.a.	-11.872			0.660	17.498			0.419	-44.905			0.085
Multiple R		0.732				0.757				0.728			
R <sup>2</sup>		0.536				0.573				0.529			
Adjusted R <sup>2</sup>		0.466				0.509				0.458			
F-ratio		7.638 ( $p = 0.000$ )				8.871 ( $p = 0.000$ )				7.423 ( $p = 0.000$ )			

\* One-tailed statistical test

Table 5.5 (Continued)

## Results of OLS Multiple Regression: Word Index\*

Variables	Expected Sign	Category 2				Category 4			
		B	Tolerance	T	Prob.	B	Tolerance	T	Prob.
Current Period									
Ln (ROA93)	+	0.968	0.778	2.037	0.046	0.956	0.763	1.641	0.106
Ln (ROE93)	+	-0.415	0.866	-2.046	0.045	-0.166	0.873	-0.676	0.502
Ln (ASSETS)	+	0.212	0.479	4.586	0.000	-	-	-	-
Ln (MARCAP)	+	-	-	-	-	0.120	0.605	2.348	0.022
AUD	+	-0.046	0.800	-0.295	0.769	0.062	0.850	0.333	0.740
Sqrt (OLS)	-	0.280	0.684	0.854	0.396	0.138	0.700	0.351	0.727
Ln (LEV93)	+	-0.106	0.790	-1.360	0.178	0.100	0.847	1.110	0.275
Ln (CAPINT)	+	0.027	0.755	0.470	0.640	0.051	0.760	0.431	0.465
ENCO	+	-0.061	0.910	-0.237	0.814	0.807	0.950	2.623	0.011
Sqrt (OWN)	-	-0.035	0.764	-0.883	0.380	0.014	0.762	0.302	0.764
PRES	+	0.233	0.575	1.576	0.120	-0.099	0.604	-0.565	0.574
Constant		-6.118			0.018	-6.633			0.041
Multiple R		0.698				0.479			
R <sup>2</sup>		0.487				0.230			
Adjusted R <sup>2</sup>		0.410				0.115			
F-ratio		6.350 ( $p = 0.000$ )				1.200 ( $p = 0.047$ )			

\* One-tailed statistical test

In total disclosure, model 5, which contains prior year economic performance variables, has an adjusted  $R^2 = 46.6\%$  and this model is statistically significant ( $F = 7.638$ ;  $p = 0.000$ ). SIZE ( $p < 0.01$ ), which is measured by total sales, PRES ( $p < 0.01$ ), and CAPINT ( $p < 0.10$ ) are significant explanatory variables and in the expected sign.

In category 1, model 4, which contains prior year economic performance variables, has an adjusted  $R^2 = 50.9\%$  and this model is statistically significant ( $F = 8.871$ ;  $p = 0.000$ ). SIZE ( $p < 0.01$ ), which is measured by total assets, PRES ( $p < 0.05$ ) and ENCO ( $p < 0.10$ ) are significant variables and in the expected sign.

In category 2, model 10, which contains current year economic performance variables, has an adjusted  $R^2 = 41\%$  and this model is statistically significant ( $F = 6.350$ ;  $p = 0.000$ ). ROA93, ROE93 and SIZE, which is measured by total assets (all with  $p < 0.05$ ), are significant explanatory variables. Except for ROE93, these explanatory variables are in the expected sign.

In category 3, model 3, which contains prior year economic performance variables has an adjusted  $R^2 = 45.8\%$  and this model is statistically significant ( $F = 7.423$ ;  $p = 0.000$ ). SIZE, which is measured by total assets, and PRES (both with  $p < 0.01$ ) are significant variables and in the expected sign.

In category 4, model 12, which contains current year economic performance variables, has an adjusted  $R^2 = 11.5\%$  and this model is statistically significant ( $F = 1.998$ ;  $p < 0.05$ ). SIZE, which is measured by market capitalisation, and ENCO (both with  $p < 0.05$ ) are significant variables and in the expected sign.



In summary, in the five "best" models variable SIZE is the most significant variable to total and categories of disclosure regardless of measure being used. PRES has significant influence on the extent of total disclosure, disclosure in category 1 and category 3. In addition, ENCO is significantly associated with the extent of disclosure in category 1 and category 4, whereas ROA93 and ROE93 are significantly associated with the extent of disclosure in category 2. Except for ROE93, these variables have the expected sign.

### 5.5.2.2 Unweighted Index

Table 5.6 shows statistical results for the "best" five models in unweighted index. In this table, total disclosure, disclosure in category 1, category 2 and category 4 are grouped together because they relate to models which contain current year economic performance variables whereas disclosure in category 3 is associated with a model which contains prior year economic performance variables. Tolerance levels of total and categories of disclosure indicate there is no harmful multicollinearity. Tolerance coefficients are far from zero and VIF coefficients for the variables confirm the absence of harmful multicollinearity.

In total disclosure, model 8, which contains current year economic performance variables, has an adjusted  $R^2 = 56.2\%$  and this model is statistically significant ( $F = 10.862$ ;  $p = 0.000$ ). Variable SIZE, which is measured by total sales, ( $p = 0.00$ ) and PRES ( $p < 0.01$ ) are significant variables and in the expected sign.

Similarly, model 8 is the best for disclosure in category 1. This model has an adjusted  $R^2 = 52.7\%$  and is statistically significant ( $F = 9.594$ ;  $p = 0.000$ ). Five

Table 5.6

## Results of OLS Multiple Regression: Unweighted Index\*

Variables	Expected Sign	Category 3			
		B	Tolerance	T	Prob.
Prior Period					
Ln (ROA92)	+	1.292	0.741	1.156	0.252
Ln (ROE92)	+	-0.047	0.695	-0.336	0.738
Ln (total assets)	+	0.082	0.435	3.668	0.000
AUD	+	-0.017	0.770	-0.221	0.826
Sqrt (OLS)	-	0.133	0.660	0.862	0.392
Ln (LEV92)	+	-0.005	0.721	-0.119	0.905
Ln (CAPINT)	+	0.031	0.662	1.084	0.282
ENCO	+	0.005	0.912	0.042	0.966
Sqrt (OWN)	-	-0.008	0.754	-0.431	0.668
PRES	+	0.197	0.577	2.876	0.005
Constant	n.a.	-10.034		-1.388	0.170
Multiple R		0.72325			
R <sup>2</sup>		0.52309			
Adjusted R <sup>2</sup>		0.45083			
F-ratio		7.23903 (p = 0.000)			

\* One-tailed statistical test

Table 5.6 (Continued)

Results of OLS Multiple Regression: Unweighted Index\*

Variables	Expected Sign	Total Disclosure				Category 1				Category 2				Category 4			
		B	Tolerance	T	Prob.	B	Tolerance	T	Prob.	B	Tolerance	T	Prob.	B	Tolerance	T	Prob.
<b>Current Period</b>																	
Ln (ROA93)	+	0.229	0.785	0.884	0.380	0.135	0.785	0.711	0.479	0.195	0.778	2.097	0.040	0.148	0.778	1.581	0.119
Ln (ROE93)	+	-0.079	0.839	-0.702	0.485	-0.114	0.839	-1.383	0.171	-0.077	0.866	-1.928	0.058	-0.039	0.850	-0.978	0.332
Ln (SALES)	+	0.117	0.452	4.813	0.000	0.082	0.452	4.630	0.000	-	-	-	-	-	-	-	-
Ln (ASSETS)	+	-	-	-	-	-	-	-	-	0.044	0.479	4.837	0.000	-	-	-	-
Ln (MARCAP)	+	-	-	-	-	-	-	-	-	-	-	-	-	0.026	0.605	3.183	0.002
AUD	+	-9.960	0.823	-0.012	0.991	-0.006	0.823	-0.103	0.918	-0.010	0.800	-0.323	0.747	-0.015	0.861	-0.501	0.618
Ln (S-W)	-	0.174	0.653	1.438	0.155	0.135	0.653	1.524	0.132	-	-	-	-	-0.031	0.678	-0.734	0.466
Sqrt (OLS)	-	-	-	-	-	-	-	-	-	0.055	0.684	0.830	0.393	-	-	-	-
Ln (LEV93)	+	-0.070	0.730	-1.569	0.121	-0.070	0.730	-2.158	0.035	-0.020	0.790	-1.337	0.186	-1.256	0.865	-0.009	0.993
Ln (CAPINT)	+	0.051	0.793	1.663	0.101	0.021	0.793	0.943	0.349	0.003	0.755	0.230	0.819	0.004	0.767	0.351	0.726
ENCO	+	0.161	0.895	1.138	0.259	0.201	0.895	1.939	0.057	0.010	0.910	0.195	0.846	0.110	0.923	2.193	0.032
Sqrt (OWN)	-	-0.031	0.732	-1.400	0.166	-0.031	0.732	-1.905	0.061	-0.007	0.764	-0.895	0.374	2.382	0.729	0.930	0.976
PRES	+	0.248	0.558	3.011	0.004	0.135	0.558	2.237	0.029	0.042	0.575	1.438	0.155	-0.020	0.585	-0.697	0.488
Constant		-2.492			0.075	-1.145			0.260	-1.286			0.012	-0.913			0.081
Multiple R		0.786				0.767				0.704				0.502			
R <sup>2</sup>		0.619				0.589				0.496				0.252			
Adjusted R <sup>2</sup>		0.562				0.527				0.420				0.140			
F-ratio		10.862 (p = 0.000)				9.594 (p = 0.000)				6.582 (p = 0.000)				2.258 (p = 0.024)			

\* One-tailed statistical test

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variables have significant explanatory power: SIZE ( $p = 0.00$ ), which is measured by total sales, ENCO ( $p < 0.10$ ), LEV93 ( $p < 0.05$ ), OWN ( $p < 0.10$ ), and PRES ( $p < 0.05$ ). Except for LEV93, these variables have the expected sign.

In category 2, model 10, which contains current year economic performance variables has an adjusted  $R^2 = 42\%$  and this model is statistically significant ( $F = 6.582$ ;  $p = 0.000$ ). Variables SIZE ( $p = 0.00$ ), which is measured by total assets, ROA93 ( $p < 0.05$ ) and ROE93 ( $p < 0.10$ ), have significant explanatory power. Except for ROE93 which is in the opposite sign, these variables have the expected sign.

Disclosure in category 3, model 3, which contains prior year economic performance variables has an adjusted  $R^2 = 45.1\%$  and this model is statistically significant ( $F = 7.239$ ;  $p = 0.000$ ). SIZE ( $p < 0.01$ ), which is measured by total assets, and PRES ( $p < 0.01$ ) are significant variables in this model and in the expected sign.

Disclosure in category 4, model 7, which contains current year economic performance variables has an adjusted  $R^2 = 14\%$  and is statistically significant ( $F = 2.258$ ;  $p = 0.024$ ). Two variables are found to have significant explanatory power, namely, SIZE ( $p < 0.01$ ), which is measured by market capitalisation, and ENCO ( $p < 0.05$ ). These variables have the expected sign.

In summary, whatever measure being used, SIZE is the most significant variable to voluntary environmental disclosure in terms of total and all categories of disclosure. PRES is significantly associated with total disclosure, disclosure in category 1 and category 3. ENCO significantly relates to disclosure in category 1 and category 4. LEV93 and OWN is significantly

associated with disclosure in category 1 whilst ROA93 and ROE93 are significantly associated with category 2. Except for LEV93 and ROE93, these variables have the expected sign.

### 5.5.2.3 Weighted Index

Table 5.7 provides statistical results for the "best" five models in weighted index. In this table, total disclosure, category 1, category 2 and category 3 are grouped together because they are associated with models which contain prior year economic performance variables. Category 4 is tabulated separately because it relates to current year economic performance variables. Tolerance levels for all variables in the models indicate there is no harmful multicollinearity. VIF coefficients are less than 10 which confirms the absence of harmful multicollinearity in the models.

In total disclosure, model 5, which contains prior year economic performance variables, has an adjusted  $R^2 = 39.9\%$  and is statistically significant ( $F = 6.039$ ,  $p = 0.000$ ). SIZE ( $p < 0.05$ ), which is measured by total sales, RISK (S-W) ( $p < 0.10$ ), and PRES ( $p < 0.01$ ) are significant variables. Except for RISK (S-W), they have the expected sign.

Model 5 is also the best for category 1. It has an adjusted  $R^2 = 38.4\%$  and is statistically significant ( $F = 5.734$ ;  $p = 0.000$ ). Variables ROE92 ( $p < 0.05$ ), SIZE ( $p < 0.01$ ) which is measured by total sales, and PRES ( $p < 0.10$ ) are significant in this model. SIZE and PRESS are in the expected sign whilst ROE92 is not in the expected sign.

Table 5.7

## Results of OLS Multiple Regression: Weighted Index\*

Variables	Expected Sign	Total Disclosure				Category 1				Category 2				Category 3			
		B	Tolerance	T	Prob.	B	Tolerance	T	Prob.	B	Tolerance	T	Prob.	B	Tolerance	T	Prob.
<b>Prior Period</b>																	
Ln (ROA92)	+	2.304	0.747	0.865	0.390	0.918	0.747	0.417	0.678	2.268	0.741	2.064	0.043	4.769	0.741	1.994	0.050
Ln (ROE92)	+	-0.425	0.737	-1.315	0.193	-0.569	0.737	-2.128	0.037	-0.340	0.695	-2.490	0.015	-0.235	0.695	-0.791	0.432
Ln (SALES)	+	0.125	0.444	2.530	0.014	0.122	0.444	2.982	0.004	-	-	-	-	-	-	-	-
Ln(ASSETS)	+	-	-	-	-	-	-	-	-	0.083	0.435	3.758	0.000	0.118	0.435	2.467	0.016
AUD	+	0.163	0.810	0.920	0.361	0.029	0.810	0.195	0.846	0.010	0.770	0.129	0.898	0.066	0.770	0.404	0.688
Ln (S-W)	-	0.449	0.612	1.785	0.079	0.288	0.612	1.382	0.172	-	-	-	-	-	-	-	-
Sqrt (OLS)	-	-	-	-	-	-	-	-	-	0.310	0.660	2.052	0.044	0.350	0.660	1.064	0.291
Ln (LEV92)	+	0.042	0.717	0.459	0.648	-0.021	0.717	-0.277	0.782	-0.030	0.721	-0.809	0.422	0.031	0.721	0.374	0.710
Ln (CAPINT)	+	0.094	0.717	1.431	0.157	0.045	0.717	0.836	0.406	0.014	0.662	0.503	0.617	0.061	0.662	1.000	0.321
ENCO	+	0.248	0.899	0.873	0.386	0.337	0.899	1.429	0.158	0.053	0.912	0.460	0.647	0.030	0.912	0.120	0.905
Sqrt (OWN)	-	-0.038	0.715	-0.843	0.402	-0.037	0.715	-1.003	0.319	-0.016	0.754	-0.873	0.386	-0.018	0.754	-0.464	0.644
PRES	+	0.443	0.575	2.699	0.009	0.263	0.575	1.936	0.057	0.030	0.577	0.447	0.656	0.383	0.577	2.615	0.011
Constant	n.a.	-15.499			0.367	-4.804			0.735	-15.021			0.038	-33.294			0.035
Multiple R		0.691				0.682				0.621				0.653			
R <sup>2</sup>		0.478				0.465				0.385				0.427			
Adjusted R <sup>2</sup>		0.399				0.384				0.292				0.340			
F-ratio		6.039 (p = 0.000)				5.734 (p = 0.000)				4.133 (p = 0.000)				4.919 (p = 0.000)			

\* One-tailed statistical test

**Table 5.7 (Continued)**

**Results of OLS Multiple Regression: Weighted Index\***

Variables	Expected Sign	Category 4			Prob.
		B	Tolerance	T	
<b>Current Period</b>					
Ln (ROA93)	+	0.331	0.778	1.293	0.200
Ln (ROE93)	+	-0.097	0.850	-0.883	0.380
Ln (MARVAL)	+	0.045	0.605	1.969	0.053
AUD	+	0.014	0.861	0.166	0.869
Ln (S-W)	-	-0.020	0.678	-0.173	0.863
Ln (LEV93)	+	0.049	0.865	1.235	0.221
Ln (CAPINT)	+	0.010	0.767	0.335	0.739
ENCO	+	0.257	0.923	1.879	0.065
Sqrt (OWN)	-	0.003	0.729	0.123	0.903
PRES	+	-0.036	0.585	-0.450	0.654
Constant	n.a.	-1.970			0.166
Multiple R		0.416			
R <sup>2</sup>		0.173			
Adjusted R <sup>2</sup>		0.049			
F-ratio		1.400 ( $p = 0.199$ )			

\* One-tailed statistical test

Disclosure in category 2, model 3 is statistically significant ( $F= 4.133$ ;  $p = 0.000$ ). This model, which contains prior year economic performance variables, has an adjusted  $R^2 = 29.2\%$ . SIZE ( $p = 0.000$ ), which is measured by total assets, RISK (OLS), ROA92 and ROE92 with  $p < 0.05$  are significant explanatory variables. Except for RISK (OLS), they have the expected sign.

Similarly, model 3 is also the best model in category 3. This model has an adjusted  $R^2 = 34\%$  and is statistically significant ( $F = 4.919$ ;  $p = 0.0001$ ). ROA92 ( $p = 0.050$ ), SIZE ( $p < 0.05$ ), which is measured by total assets, and PRES ( $p < 0.05$ ) are found to be significant variables in this model and have the expected sign.

Disclosure in category 4, model 7 is not statistically significant ( $F = 1.400$ ;  $p = 0.199$ ). This model, which contains current year economic performance variables, has an adjusted  $R^2 = 4.9\%$ . Nevertheless, SIZE, which is measured by market capitalisation, and ENCO, both with  $p < 0.10$ , are found to be significant variables in the model and they have the expected sign.

In summary, in the "best" five models, SIZE is the most significant explanatory variable and in the expected sign regardless of measure being used. PRES is significantly associated with total disclosure, disclosure in category 1 and category 3 whereas ENCO is significantly associated with category 4. RISK (OLS), ROA92 and ROE92 significantly relate to disclosure in category 2 whereas RISK (S-W) is significantly associated with total disclosure. Except for RISK (OLS and S-W) and ROE92, these variables have the expected sign.



## 5.6 Discussion of the Results

Based on the "best" models for each index, it is found that each index explains differently the extent of total and categories of voluntary environmental disclosure. This is also the case for the dimensions of stakeholder theory. Discussion of the extent of disclosure and stakeholder theory is presented in the following subsections.

### 5.6.1 The Extent of Environmental Disclosure

Total disclosure for the unweighted index is significantly associated with model 8 and produces the highest adjusted  $R^2 = 56.2\%$ . The adjusted  $R^2$  is considerably higher than the word and weighted indices. As this index treats disclosure and non-disclosure companies equally (Cooke, 1989), it possesses a neutral procedure.

Disclosure in category 1 (corporate environmental policies and strategies) for the unweighted index is significantly associated with model 8 and produces the highest adjusted  $R^2 = 52.7\%$ . Mineral mining companies tend to develop advanced environmental programs (Coopers & Lybrand cited in Kestigian, 1991) and disclose them in the annual report. This disclosure provides positive information to stakeholders (Deegan, 1994; Deegan and Gordon, 1994) and therefore the companies are willing to disclose this information.

Disclosure in category 2 (recognition of environmental activities) for the unweighted index is significantly associated with model 10 and produces the highest adjusted  $R^2 = 42\%$ . This is almost identical to the word index, which

has an adjusted  $R^2$  of 41%. The extent of disclosure in this category is expected because disclosure of this information is positive information to stakeholders.

Disclosure in category 3 (prevention or repair of environmental damage) for the word index is significantly associated with model 3 and produces the highest adjusted  $R^2 = 45.8\%$ . The unweighted index is marginally lower with an adjusted  $R^2$  of 45.1%. This is the only model that contains prior year economic performance variables. To undertake prevention or repair of environmental damage requires a considerable outlay and companies should satisfy expectations of shareholders prior to doing these environmental activities (R. W. Roberts, 1992). Therefore, a reasonable level of economic performance is necessary in dealing with environmental activities (Ullmann, 1985).

Disclosure in category 4 (environmental liabilities) for the unweighted index is significantly associated with model 7 and produces the highest adjusted  $R^2 = 14\%$ . A possible explanation is that the disclosure of environmental liability information can create conflicts of interest to corporate stakeholders (Cerf, 1993). Therefore management is unwilling to disclose this sensitive information.

In summary, the unweighted index is the "best" index for total and three categories of disclosure whilst the word index is the "best" for disclosure in category 3. The highest information to be voluntarily disclosed in the annual report is information relating to corporate environmental policies and strategies (category 1) and the lowest information to be disclosed is information about environmental liabilities (category 4).

### 5.6.2 Stakeholder Theory

The stakeholder theoretical framework is applied to explain each model. As discussed in the previous subsection, the unweighted index generates the highest adjusted  $R^2$  for total and three categories of disclosure whilst the word index produces the highest adjusted  $R^2$  for disclosure in category 3. Consequently, discussion of the results based on the significant variables in each model in the unweighted index and the word index are elaborated in the framework of the three dimensions of the stakeholder theory.

Model 8 is significantly associated with the extent of total disclosure and PRES and SIZE measured by total sales are significant variables in this model and in the expected sign. This means that hypotheses H3 and H8 (H82) are supported. The other variables in this model are not significant and therefore hypotheses H1, H2 (H22), H4, H5 (H52), H6 (H62), H7 (H72), H9, and H10 are rejected. PRES represents stakeholder power dimension and SIZE is treated as a control variable. Thus, the stakeholder power dimension partially explains the extent of total disclosure whilst the strategic posture and economic performance dimensions do not significantly explain the extent of disclosure. This is consistent with the findings of R. W. Roberts (1992) that social disclosure was undertaken to reduce governmental influence.

Similarly, model 8 is significantly associated with the extent of disclosure in category 1 and OWN, LEV, PRES, ENCO and SIZE measured by total sales are significant in this model. However, LEV is in the opposite sign. This means that hypotheses H1, H3, H4 and H8 (H82) are supported. The other variables in this model are not significant and therefore hypotheses H2 (H22), H5 (H52), H6 (H62), H7 (H72), H9, and H10 are rejected. OWN and

PRES represent stakeholder power dimension and ENCO represents strategic posture dimension. The extent of disclosure in category 1 is significantly associated with the strategic posture dimension and is partially associated with the stakeholder power dimension. However, the economic performance dimension does not significantly explain the extent of disclosure. The significance of widespread ownership (OWN) supports the result of Craswell and Taylor (1992) but it is contrary to the result of R. W. Roberts (1992) who used a different measure for ownership (i.e., percentage of corporation owned by management and by individual shareholders). The significance of ENCO is consistent with R. W. Roberts although the proxy used in this study is different. In other words, strategic posture is a powerful dimension in the stakeholder framework.

Model 10 is significantly associated with the extent of disclosure in category 2 and variables ROA, ROE and SIZE measured by total assets are significant in this model. However, ROE is in the opposite sign. This means that hypothesis H5 (H52) and H8 (H81) are supported. The other variables in this model are not significant and therefore hypotheses H1, H2 (H22), H3, H4, H6 (H62), H7 (H72), H9, and H10 are rejected. ROA represents economic performance dimension. Accordingly, the economic performance dimension partially explains the extent of disclosure in category 2 whilst the stakeholder power and strategic posture dimensions do not significantly explain this disclosure. The significance of ROA in part supports the contention of McGuire et al. (1988) that ROA is closely related to corporate social responsibility. The finding of ROE is inconsistent with the finding of R. W. Roberts (1992). The possible reason for this different result is that he adopted a different measure, growth in return on equity, and four year period.

Model 3 is significantly associated with the extent of disclosure in category 3 measured by the word index and PRES and SIZE measured by total assets are significant variables in this model and in the expected sign. This means that hypothesis H3 and H81 are supported. The other variables in this model are not significant and therefore hypotheses H1, H2 (H21), H4, H5 (H51), H6 (H61), H7 (H71), H9, and H10 are rejected. PRES is the only significant variable in stakeholder power dimension. Accordingly, the stakeholder power dimension partially explains the extent of disclosure in category 3 whilst the strategic posture and economic performance dimensions do not significantly explain this disclosure.

Model 7 is significantly associated with the extent of disclosure in category 4 and ENCO and SIZE measured by market capitalisation are significant variables in the model and in the expected direction. This means that hypothesis H4 and H83 are accepted. The other variables in this model are not significant and therefore hypotheses H1, H2 (H22), H3, H5 (H52), H6 (H62), H7 (H72), H9, and H10 are rejected. As ENCO represents strategic posture dimension this dimension significantly explains the extent of disclosure in category 4. The stakeholder power and economic performance dimensions do not significantly explain this disclosure.

In conclusion, the empirical results provide evidence that the stakeholder theoretical framework only partially explains the motivation of firms to voluntarily disclose environmental information. Three dimensions of stakeholder theory in each of the five best models are associated with different categories of disclosure. Stakeholder power could only partially explain total disclosure and disclosure in category 1 in the unweighted index and disclosure in category 3 in the word index. Strategic posture is the most significant dimension explaining the extent of disclosure in category 1 and

category 4. SIZE as a control variable is the most significant variable in terms of total and categories of disclosure. These findings do not entirely corroborate the theoretical framework developed by Ullmann (1985) and the results of R. W. Roberts (1992).

## 5.7 Summary

The results of statistical analyses of the variables in the study were elaborated in this chapter. Statistical problems of the observed data were resolved by conducting transformations.

Three indices were used to measure the extent of voluntary environmental disclosure. The variations of alternative measures for SIZE, RISK, ROA, ROE, and LEV produced twelve different models of explanatory variables. Pearson Product Moment Correlation, tolerance and variance inflation factor tests were performed to check the presence of multicollinearity among the explanatory variables in the twelve models. The results indicated there was no harmful multicollinearity among the variables.

The main statistical test in this study is OLS multiple regression analysis. The results suggest that the unweighted index (dichotomous index) best fitted the extent of disclosure followed by word index (the number of words) and then weighted index (the importance of environmental items). It was found that the most significant form of disclosure was environmental policies and strategies (category 1) and the least significant to be environmental liabilities (category 4).

Not all three dimensions of stakeholder theory are significant in total or any category of disclosure. The strategic posture dimension of stakeholder theory is significantly associated with the extent of disclosure in category 1 and category 2. Stakeholder power dimension partially explains the extent of total disclosure, disclosure in category 1 and category 3. Economic performance dimension is partially associated with the extent of disclosure in category 2. Two dimensions, stakeholder power and strategic posture, are associated with the extent of disclosure in category 1.

Conclusions and implications of this study and suggestions for further research are presented in chapter 6. Limitations to this study are also discussed in this chapter.

## Chapter 6

### CONCLUSIONS

#### 6.1 Summary

A review of literature discussed in chapter 2 provides pertinent explanatory variables associated with voluntary social and environmental disclosure. It was noted that firm size, industry classification, profitability, systematic risk, leverage, ownership, capital intensity, social pressures and the presence of social responsibility committee were associated with the extent of voluntary social and environmental disclosure. In prior research, various theoretical frameworks have been used to explain the relationship of firm characteristics and the incidence of voluntary social and environmental disclosure.

Chapter 3 deals with the development of stakeholder theory as proposed by Ullmann (1985) and the development of hypotheses. Based on the stakeholder framework, 17 hypotheses were generated. These hypotheses were based on 11 explanatory variables, which were grouped into three dimensions: stakeholder power variables - ownership diffusion, political pressure, operating leverage; strategic posture - the presence of an environmental responsibility committee; economic performance - return on assets, return on equity, systematic risk; and control variables - firm size, capital intensity, independent auditor, commercial production.

The dependent variable is the extent of voluntary environmental disclosure consisting of four categories: environmental policy, prevention of environmental damage, public recognition of environmental activities and environmental liabilities. This study examined overall disclosure as well as



categories of disclosure. Three different indices, word index, unweighted index and weighted index, were adopted to measure the extent of environmental disclosure.

Chapter 4 discusses research design and procedure, definition of variables and statistical technique. Data for the 1992 and 1993 period were primarily obtained from the AGSM Annual Reports Microfiche File. Other data were taken from the AMIC 1994 annual report, the Australian Stock Exchange Journal, June 1993 and December 1993 editions, and the AGSM Risk Measurement Service. Definitions of predictor variables follow those of previous studies, except for political pressure and commercial production.

Statistical problems relating to raw data for both dependent and independent variables were examined and the existence of problems were resolved by transformation. Multicollinearity was tested by Pearson correlation matrix, tolerance and VIF test. The results indicated the absence of this problem.

Results of data analysis were presented and elaborated in chapter 5. Multivariate analysis was applied to test the relationships of 12 models of explanatory variables and the extent of total and categories of voluntary environmental disclosure. In this study there are 180 multivariate analyses and discussions of the results focused on the "best" five multiple regression models for each index. The model in each category of disclosure for each index that had the highest adjusted  $R^2$  was selected and tabulated. Detailed results of the statistical tests were then elaborated in this chapter.

## 6.2 Findings of the Study

The index that best fitted the extent of environmental disclosure was the unweighted index. This index produced four of the five best models of explanatory variables all of which were statistically significant. However, the remaining model attributed to the word index was only marginally better. Disclosure of information relating to environmental policies and strategies was the most significant with an adjusted  $R^2 = 56.2\%$  whilst environmental liability related information was the least significant with an adjusted  $R^2 = 14\%$ .

The implication of this finding is that, content analysis used in the unweighted index can capture the extent of environmental disclosure made in the annual report in relation to environmental policies and strategies, recognition of environmental activities, prevention or repair of environmental damage and environmental liabilities. Consequently, users can evaluate environmental information based on the presence or absence of its disclosure in the annual report without having to consider the relative importance or the amount of information. The adjusted  $R^2$  for disclosure of environmental liabilities is considerably lower than for other categories, which is probably due to it not being seen as positive information. This implies that the regulators of accounting information need to monitor disclosure of environmental liabilities.

This study also provided empirical evidence on the extent of voluntary environmental disclosure by Australian listed mineral mining companies within the stakeholder theoretical framework. It was found that not all three dimensions of the theory were significant in any one model. In the stakeholder power dimension, ownership diffusion and the membership of

the AMIC partially explained the extent of total disclosure, disclosure of environmental policy related information and disclosure of repair of environmental damage. In the strategic posture dimension, the presence of environmental responsibility committee was significantly associated with disclosure of environmental policy related information and environmental liability related information. Thus, the extent of environmental policy related disclosure could be explained by the stakeholder power and strategic power dimensions. In the economic performance dimension, return on assets was associated with disclosure of public recognition of corporate environmental activities. Firm size a control variable was significant among the three dimensions.

Therefore, the stakeholder theoretical framework partially explained practice of environmental disclosure by Australian listed mineral mining companies. The implication of this finding is that other variables need to be included in the dimensions of the stakeholder model. For example, sources of information other than the annual report. Ideally, location of mining companies could be used to test the sensitivity of a mining area but this is not possible for all companies as a considerable number have multiple locations.

### **6.3 Limitations and Suggestions for Future Research**

The results of this study are subject to several limitations. At the time of the study, data for systematic risk was only available to September 1993. Also, the study was limited to mineral mining companies listed in the AGSM Annual Report File. This data source contains the top 500 firms by market capitalisation therefore the results may not be generalizable. In addition,

this study includes only a single period of observations. Only one user group, financial analysts were used to assess the relative importance of each environmental item of disclosure and this may introduce bias into the results. Furthermore, environmental disclosure is not restricted to the annual report, as some companies disclose the information in other media instruments.

The limitations of this study suggest directions for future research. A longitudinal study which includes all listed mineral mining companies would enhance the generalizability of the findings. Other user groups could be used to assess the relative importance of the environmental items. Also, sources of environmental information other than the annual report could be investigated and included as an additional variable.

Further research could be undertaken in several directions. Research in environmental disclosure could include oil and gas companies and industrial companies. The needs of different user groups and how they evaluate and utilise this information could be investigated. Finally, as environmental matters are a global issue, the practice of environmental disclosure could be examined in other countries with different cultures.

Although the findings do not support all of the hypotheses, the application of the stakeholder theoretical framework together with the different indices in one study reflects the efficacy of the stakeholder framework on corporate environmental disclosure in Australia. A new variable, the membership of the AMIC, was significant. The results of this study augment the understanding of practice of voluntary environmental disclosure by Australian listed mineral mining companies.

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## Appendix A

### LIST OF MINERAL MINING COMPANIES

---

No.	Name
1.	Aberfoyle Limited*
2.	Alcan Australia
3.	Allied Queensland Coalfields Limited
4.	Anglo Pacific Resources
5.	Asarco Australia Limited*
6.	Ashton Mining Limited*
7.	Austmin Gold NL
8.	Austpac Gold NL
9.	Australian Mining Investments Limited
10.	Ballarat Goldfields NL
11.	Battle Mountain Gold Company*
12.	Bougainville Copper Limited
13.	Boulder Gold NL
14.	Burmine Limited
15.	Centaur Mining & Exploration Limited
16.	Central Norseman Gold Corporation Limited*
17.	Churchill Resources NL
18.	Climax Mining Limited
19.	Cluff Resources Pacific Limited
20.	Clutha Limited
21.	Coal & Allied Industries Limited*
22.	Comalco Limited*
23.	Consolidated Rutile Limited*
24.	Coolawin Resources Limited
25.	Coolgardie Gold NL
26.	CRA Limited*
27.	Croesus Mining NL
28.	Cudgen R.Z. Limited*
29.	Delta Gold NL
30.	Denehurst Limited*
31.	Devex Limited
32.	Dominion Mining Limited*
33.	Eastmet Limited
34.	Emperor Mines Limited
35.	Energy Resources of Australia Limited*
36.	Equatorial Mining NL
37.	Euraust Minerals Development
38.	First National Resources Trust
39.	Forrestania Gold NL
40.	Gold Mines of Kalgoorlie Limited*
41.	Golden Shamrock Mines Limited

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## Appendix A (Continued)

### LIST OF MINERAL MINING COMPANIES

---

No.	Name
42.	Great Central Mines NL
43.	Gwalia Consolidated Limited
44.	Helix Resources NL
45.	Herald Resources Limited
46.	Highlands Gold Limited
47.	Homestake Gold of Australia Limited
48.	Hunter Resources Limited
49.	Johnson's Well Mining NL
50.	Kidston Gold Mines Limited*
51.	Kitchener Mining NL
52.	Lachlan Resources NL
53.	Little River Goldfields NL
54.	Macraes Mining Company Limited
55.	Metana Minerals NL
56.	Mineral Resources (NZ) Limited
57.	Minerals Mining & Metallurgy Limited*
58.	Minproc Holdings Limited
59.	Mount Burgess Gold Mining Company Ltd
60.	Mt. Carrington Mines Ltd
61.	Mount Edon Gold Mines (Australia) Limited
62.	Mt. Kersey Mining NL
63.	Mt. Leyshon Gold Mines Limited*
64.	Mt. Martin Gold Mines NL
65.	Newcrest Mining Limited*
66.	Newmex Exploration
67.	Niugini Mining Ltd
68.	Normandy Poseidon Limited*
69.	North Broken Hill Peko Ltd*
70.	North Flinders Mines Limited*
71.	Oakbridge Limited
72.	Orion Resources NL
73.	Pasminco Limited*
74.	Pelsart Resources NL
75.	Perserverance Corporation Ltd
76.	Placer Dome Inc.
77.	Placer Pacific Limited*
78.	Plutonic Resources Limited
79.	Portman Mining Limited
80.	Poseidon Gold Limited*
81.	QCT Resources Limited*
82.	QNI Limited*

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## Appendix A (Continued)

### LIST OF MINERAL MINING COMPANIES

---

No.	Name
83.	Queensland Metals Corporation Limited
84.	Renison Goldfields Consolidated Limited*
85.	Resolute Resources Ltd
86.	Roebuck Resources NL
87.	Ross Mining NL
88.	Sabminco NL
89.	Samantha Gold NL
90.	Savage Resources Limited
91.	Sedimentary Holdings Limited
92.	Sons of Gwalia Ltd*
93.	Spargos Mining NL
94.	St. Barbara Mines Ltd
95.	Strategic Minerals Corporation NL
96.	Titan Resources NL
97.	Triad Minerals NL
98.	Union Gold Mining Company NL
99.	Valdora Minerals NL
100.	Walhalla Mining Company NL
101.	Western Australian Diamond Trust
102.	Western Mining Corporation Holdings Limited*
103.	Westralian Sands Limited*
104.	Zapopan NL

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\* Member of the Australian Mining Industry Council

## Appendix B

### Weighting Score Index

	Voluntary Environmental Items	Mean Score
<b>I.</b>	<b>COMPANIES ENVIRONMENTAL POLICIES</b>	
1.	Adoption of environmentally sensitive management technique	4.00
2.	Departments or offices for environmental affairs	2.18
3.	Setting up objectives and strategies for the environment	4.18
4.	Environmental awareness campaign	3.14
5.	Compliance with government environmental principles and regulations	8.20
6.	Implementation of environmental audit	5.00
7.	Establishment of environmental programs	6.00
<b>II.</b>	<b>RECOGNITION OF ENVIRONMENTAL ACTIVITIES</b>	
8.	Evidence of public support or approval	3.40
9.	Awards for environmental protection	3.00
<b>III.</b>	<b>PREVENTION OR REPAIR OF ENVIRONMENTAL DAMAGE</b>	
10.	Treatment of waste disposal (e.g., recycling efforts)	5.87
11.	Adoption of safe environmental practices or improvements in environmental facilities	5.95
12.	Air, water and soil emissions	4.60
13.	Undertaking wildlife preservation	3.30
14.	Estimated future costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	6.80
15.	Environmental impact assessment and research programs for environment	4.46
16.	Conservation of natural resources or energy saving measure	3.40
17.	Land reclamation	4.36
18.	Current costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	5.36
19.	Tree replanting (revegetation) scheme	3.68

## Appendix B (Continued)

### Weighting Score Index

Voluntary Environmental Items		Mean Score
<b>IV.</b>	<b>ENVIRONMENTAL LIABILITIES</b>	
20.	Admission of causing environmental problems (i.e. health related) for residents	3.56
21.	Acknowledgment of detrimental effects of activities	4.10
22.	Litigation related to environment (not listed in contingent liabilities)	5.46
	<b>TOTAL</b>	<b>100</b>

## Appendix C

### SCORING SHEET

#### FIRM IDENTIFICATION

Company Name: \_\_\_\_\_

Balance Date: \_\_\_\_\_

	<u>1992</u>	<u>1993</u>
1. Gross plant assets:	_____	_____
2. Total Assets:	_____	_____
3. Total Debt:	_____	_____
4. Ownership Diffusion:	_____	_____
5. Total ordinary shares:	_____	_____
6. Total Sales:	_____	_____
7. Net Income: (before extraordinary items & income tax)	_____	_____
8. Income attributable to shareholders (after extraordi- nary items and income tax):	_____	_____
9. Market Capitalisation:	_____	_____
10. Beta ( $\beta$ ):	_____	_____
11. Auditor Name:	_____	
12. The Presence of Environmental Committee:	Yes	No
13. Membership of AMIC :	Yes	No
14. Commercial Production :	Yes	No

Additional Information: \_\_\_\_\_

## Appendix C (Continued)

### SCORING SHEET

#### Ratio Variables

1. Operating Leverage =  $\frac{\text{Total Debt}}{\text{Total Assets}}$   
(1992)

Operating Leverage =  $\frac{\text{Total Debt}}{\text{Total Assets}}$   
(1993)

2. Return on Assets =  $\frac{\text{Net income before extraordinary items and income tax}}{\text{Total Assets}}$   
(1992)

Return on Assets =  $\frac{\text{Net income before extraordinary items and income tax}}{\text{Total Assets}}$   
(1993)

3. Return on Equity =  $\frac{\text{Net income after extraordinary items and income tax}}{\text{Total ordinary shares}}$   
(1992)

Return on Equity =  $\frac{\text{Net income after extraordinary items and income tax}}{\text{Total ordinary shares}}$   
(1993)

4. Capital Intensity =  $\frac{\text{Gross plant assets}}{\text{Total Sales}}$   
(1993)

Appendix C (Continued)

SCORING SHEET

ENVIRONMENTAL ITEMS	INDEX I (No. of words)	INDEX II (Unweighted)	INDEX III (Weighted)
<b>I. COMPANIES ENVIRONMENTAL POLICIES</b>			
1. Setting up objectives and strategies for the environment	_____	_____	_____
2. Establishment of environmental programs	_____	_____	_____
3. Adoption of environmentally sensitive management technique	_____	_____	_____
4. Compliance with government environmental principles and regulations	_____	_____	_____
5. Implementation of environmental audit	_____	_____	_____
6. Environmental awareness campaign	_____	_____	_____
7. Departments or offices for environmental affairs	_____	_____	_____
Total	_____	_____	_____
<b>II. RECOGNITION OF ENVIRONMENTAL ACTIVITIES</b>			
8. Awards for environmental protection	_____	_____	_____
9. Evidence of public support or approval	_____	_____	_____
Total	_____	_____	_____

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Appendix C (Continued)

SCORING SHEET

ENVIRONMENTAL ITEMS	INDEX I (No. of words)	INDEX II (Unweighted)	INDEX III (Weighted)
<b>III. PREVENTION OR REPAIR OF ENVIRONMENTAL DAMAGE</b>			
10. Conservation of natural resources or energy saving measure	_____	_____	_____
11. Current costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	_____	_____	_____
12. Estimated future costs for environmental rehabilitation (restoration) activities (not as parts of financial statement)	_____	_____	_____
13. Land reclamation	_____	_____	_____
14. Tree replanting (revegetation) scheme	_____	_____	_____
15. Treatment of waste disposal (e.g., recycling efforts)	_____	_____	_____
16. Adoption of safe environmental practices or improvements in environmental facilities	_____	_____	_____
17. Undertaking wildlife preservation	_____	_____	_____
18. Environmental impact assessment and research programs for environment	_____	_____	_____
19. Air, water and soil emissions	_____	_____	_____
Total	_____	_____	_____

Appendix C (Continued)

SCORING SHEET

ENVIRONMENTAL ITEMS	INDEX I (No. of words)	INDEX II (Unweighted)	INDEX III (Weighted)
<b>IV. ENVIRONMENTAL LIABILITIES</b>			
20. Acknowledgment of detrimental effects of activities	_____	_____	_____
21. Litigation related to environment (not listed in contingent liabilities)	_____	_____	_____
22. Admission of causing environmental problems (i.e. health related) for residents	_____	_____	_____
Total	_____	_____	_____

SUMMARY

Group I	Index I	Index II	Index III
Group II	_____	_____	_____
Group III	_____	_____	_____
Group IV	_____	_____	_____
<b>TOTAL SCORE</b>	_____	_____	_____



Appendix D.

Correlation Matrix: Model 1

	AUD	LnCAPINT	ENCO	LnLEV92	LnMARCAP	SqrtOWN	PRES	LnROA92	LnROE92	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000 (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1615 (0.151)	1.0000 (.)						
LnMARCAP	0.3089 (0.006)	0.3098 (0.006)	0.1271 (0.271)	0.0412 (0.722)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	-0.1866 (0.104)	-0.2240 (0.050)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5732 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	-0.0668 (0.564)	0.0493 (0.670)	-0.1171 (0.311)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	0.1775 (0.123)	-0.0356 (0.759)	-0.0633 (0.584)	-0.0232 (0.841)	-0.1375 (0.233)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
SqrtOLS	-0.3061 (0.007)	-0.3494 (0.002)	-0.1283 (0.266)	0.1035 (0.370)	-0.2878 (0.011)	0.2908 (0.010)	-0.3279 (0.004)	0.0073 (0.950)	0.2437 (0.033)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 2

	AUD	LnCAPINT	ENCO	LnLEV92	LnSALES	SqrtOWN	PRES	LnROA92	LnROE92	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000 (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1651 (0.151)	1.0000 (.)						
LnSALES	0.3649 (0.001)	0.2126 (0.063)	0.2482 (0.030)	0.3609 (0.001)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	-0.1866 (0.104)	-0.2703 (0.017)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5780 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	0.0668 (0.564)	0.0493 (0.670)	-0.0564 (0.626)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	0.1775 (0.123)	-0.0356 (0.759)	0.0633 (0.584)	-0.0232 (0.841)	-0.0929 (0.422)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
SqrtOLS	-0.3061 (0.007)	-0.3494 (0.002)	-0.1283 (0.266)	0.1035 (0.370)	-0.3281 (0.004)	0.2908 (0.010)	-0.3279 (0.004)	0.0073 (0.950)	0.2437 (0.033)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 3

	AUD	LnCAPINT	ENCO	LnLEV92	LnASSETS	SqrtOWN	PRES	LnROA92	LnROE92	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000 (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1651 (0.151)	1.0000 (.)						
LnASSETS	0.4102 (0.000)	0.3436 (0.002)	0.2467 (0.031)	0.2846 (0.012)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	-0.1866 (0.104)	-0.2640 (0.020)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5909 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	-0.0668 (0.564)	0.0493 (0.670)	-0.0775 (0.503)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	-0.1775 (0.123)	-0.0356 (0.759)	-0.0633 (0.584)	-0.0232 (0.841)	-0.0898 (0.438)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
SqrtOLS	-0.3061 (0.007)	-0.3494 (0.002)	-0.1283 (0.266)	0.1035 (0.370)	-0.3744 (0.001)	0.2908 (0.010)	-0.3279 (0.004)	0.0073 (0.950)	0.2437 (0.033)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

**Appendix D (Continued)**

**Correlation Matrix: Model 4**

	AUD	LnCAPINT	ENCO	LnLEV92	LnASSETS	SqrtOWN	PRES	LnROA92	LnROE92	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000 (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1651 (0.151)	1.0000 (.)						
LnASSETS	0.4102 (0.000)	0.3436 (0.002)	0.2467 (0.031)	0.2846 (0.012)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	-0.1866 (0.104)	-0.2640 (0.020)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5909 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	-0.0668 (0.564)	0.0493 (0.670)	-0.0775 (0.503)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	-0.1755 (0.123)	-0.0356 (0.759)	-0.0633 (0.584)	-0.0232 (0.841)	-0.0898 (0.438)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
LnSW	-0.2682 (0.018)	-0.3199 (0.005)	-0.0388 (0.737)	0.0078 (0.947)	-0.3350 (0.003)	0.3945 (0.000)	-0.3647 (0.001)	0.3240 (0.004)	0.2494 (0.029)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 5

	AUD	LnCAPINT	ENCO	LnLEV92	LnSALES	SqrtOWN	PRES	LnROA92	LnROE92	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000 (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1651 (0.151)	1.0000 (.)						
LnSALES	0.3649 (0.001)	0.2126 (0.063)	0.2482 (0.030)	0.3609 (0.001)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	-0.1866 (0.104)	-0.2703 (0.017)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5780 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	0.0668 (0.564)	0.0493 (0.670)	-0.0564 (0.626)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	0.1775 (0.123)	-0.0356 (0.759)	-0.0633 (0.584)	-0.0232 (0.841)	-0.0929 (0.422)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
LnSW	-0.2682 (0.018)	-0.3199 (0.005)	-0.0388 (0.737)	0.0078 (0.947)	-0.4177 (0.000)	0.3945 (0.000)	-0.3647 (0.001)	0.3240 (0.004)	0.2494 (0.029)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 6

	AUD	LnCAPINT	ENCO	LnLEV92	LnMARCAP	SqrtOWN	PRES	LnROA92	LnROE92	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.2185 (0.056)	1.0000* (.)								
ENCO	0.1055 (0.361)	0.0701 (0.545)	1.0000 (.)							
LnLEV92	0.0476 (0.681)	-0.2058 (0.073)	0.1651 (0.151)	1.0000 (.)						
LnMARCAP	0.3089 (0.006)	0.3098 (0.006)	0.1271 (0.271)	0.0412 (0.722)	1.0000 (.)					
SqrtOWN	-0.1600 (0.164)	-0.3386 (0.003)	-0.1739 (0.130)	0.1866 (0.104)	-0.2240 (0.050)	1.0000 (.)				
PRES	0.1966 (0.087)	0.2436 (0.033)	0.1880 (0.102)	0.0963 (0.405)	0.5732 (0.000)	-0.1422 (0.217)	1.0000 (.)			
LnROA92	-0.1566 (0.174)	-0.1906 (0.097)	-0.0668 (0.564)	0.0493 (0.670)	-0.1171 (0.311)	0.1759 (0.126)	-0.1334 (0.247)	1.0000 (.)		
LnROE92	-0.1775 (0.123)	-0.0356 (0.759)	-0.0633 (0.584)	-0.0232 (0.841)	-0.1375 (0.233)	0.1161 (0.315)	-0.2800 (0.014)	0.4181 (0.000)	1.0000 (.)	
LnSW	-0.2682 (0.018)	-0.3199 (0.005)	-0.0388 (0.737)	0.0078 (0.947)	-0.2811 (0.013)	0.3945 (0.000)	-0.3647 (0.001)	0.3240 (0.004)	0.2494 (0.029)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 7

	AUD	LnCAPINT	ENCO	LnLEV93	LnMARCAP	SqrtOWN	PRES	LnROA93	LnROE93	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.1884 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnMARCAP	0.2850 (0.011)	0.3133 (0.005)	0.1254 (0.274)	0.0423 (0.713)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2186 (0.055)	1.0000 (.)				
PRES	-0.2107 (0.067)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5653 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.3232 (0.004)	0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1927 (0.091)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
LnSW	-0.2608 (0.021)	-0.3183 (0.005)	-0.0389 (0.735)	-0.1227 (0.284)	-0.2805 (0.013)	0.3935 (0.000)	-0.3636 (0.001)	0.1822 (0.110)	0.2770 (0.014)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 8

	AUD	LnCAPINT	ENCO	LnLEV93	LnSALES	SqrtOWN	PRES	LnROA93	LnROE93	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.1184 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnSALES	0.3664 (0.001)	0.2064 (0.070)	0.2492 (0.028)	0.3395 (0.002)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2732 (0.016)	1.0000 (.)				
PRES	0.2107 (0.064)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5796 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.2363 (0.037)	-0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1182 (0.303)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
LnSW	-0.2608 (0.021)	-0.3183 (0.005)	-0.0389 (0.735)	-0.1227 (0.284)	-0.4173 (0.000)	0.3935 (0.000)	-0.3636 (0.001)	0.1822 (0.110)	0.2770 (0.014)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.



Appendix D (Continued)

Correlation Matrix: Model 9

	AUD	LnCAPINT	ENCO	LnLEV93	LnASSETS	SqrtOWN	PRES	LnROA93	LnROE93	LNSW
AUD	1.0000* (.)									
LnCAPINT	0.1884 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnASSETS	0.4005 (0.000)	0.3411 (0.002)	0.2469 (0.029)	0.1930 (0.091)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2640 (0.020)	1.0000 (.)				
PRES	0.2107 (0.068)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5896 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.2473 (0.029)	0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1227 (0.284)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
LnSW	-0.2608 (0.021)	-0.3183 (0.005)	-0.0389 (0.735)	-0.1227 (0.284)	-0.3350 (0.003)	0.3935 (0.000)	-0.3636 (0.001)	0.1822 (0.110)	0.2770 (0.014)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 10

	AUD	LnCAPINT	ENCO	LnLEV93	LnASSETS	SqrtOWN	PRES	LnROA93	LnROE93	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.1884 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnASSETS	0.4005 (0.000)	0.3411 (0.002)	0.2469 (0.029)	0.1930 (0.091)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2640 (0.020)	1.0000 (.)				
PRES	0.2107 (0.064)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5896 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.2473 (0.029)	0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1227 (0.284)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
SqrtOLS	-0.2940 (0.009)	-0.3490 (0.002)	-0.1279 (0.264)	0.1492 (0.192)	-0.3742 (0.001)	0.2890 (0.010)	-0.3257 (0.004)	0.3150 (0.005)	0.2067 (0.069)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 11

	AUD	LnCAPINT	ENCO	LnLEV93	LnSALES	SqrtOWN	PRES	LnROA93	LnROE93	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.1884 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnSALES	0.3664 (0.001)	0.2064 (0.070)	0.2492 (0.028)	0.3395 (0.002)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2732 (0.016)	1.0000 (.)				
PRES	0.2107 (0.064)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5796 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.2363 (0.037)	0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1182 (0.303)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
SqrtOLS	-0.2940 (0.009)	-0.3490 (0.002)	-0.1279 (0.264)	0.1492 (0.192)	-0.3270 (0.003)	0.2890 (0.010)	-0.3257 (0.004)	0.3150 (0.005)	0.2067 (0.069)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix D (Continued)

Correlation Matrix: Model 12

	AUD	LnCAPINT	ENCO	LnLEV93	LnMARCAP	SqrtOWN	PRES	LnROA93	LnROE93	SqrtOLS
AUD	1.0000* (.)									
LnCAPINT	0.1884 (0.099)	1.0000 (.)								
ENCO	0.1087 (0.343)	0.0673 (0.558)	1.0000 (.)							
LnLEV93	0.0460 (0.689)	-0.0796 (0.489)	0.0053 (0.963)	1.0000 (.)						
LnMARCAP	0.2850 (0.011)	0.3133 (0.005)	0.1254 (0.274)	0.0423 (0.713)	1.0000 (.)					
SqrtOWN	-0.1735 (0.129)	-0.3290 (0.003)	-0.1753 (0.125)	-0.2074 (0.068)	-0.2186 (0.055)	1.0000 (.)				
PRES	0.2107 (0.064)	0.2337 (0.039)	0.1895 (0.097)	0.0207 (0.857)	0.5653 (0.000)	-0.1478 (0.196)	1.0000 (.)			
LnROA93	-0.2077 (0.068)	-0.1214 (0.290)	-0.0916 (0.425)	0.1955 (0.086)	-0.3232 (0.004)	0.1128 (0.325)	-0.3350 (0.003)	1.0000 (.)		
LnROE93	-0.1317 (0.250)	-0.0339 (0.768)	0.0080 (0.945)	0.0225 (0.845)	-0.1927 (0.091)	0.1122 (0.328)	-0.2733 (0.015)	0.2512 (0.027)	1.0000 (.)	
SqrtOLS	-0.2940 (0.009)	-0.3490 (0.002)	-0.1279 (0.264)	0.1492 (0.192)	-0.2880 (0.011)	0.2890 (0.010)	-0.3257 (0.004)	0.3150 (0.005)	0.2067 (0.069)	1.0000 (.)

\* The top number represents the degree of correlation and the bottom number represents the level of significance.

Appendix E

Results of OLS Multiple Regression

Variables	Word Index			Unweighted Index			Weighted Index		
	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F
<b>Total Disclosure</b>									
Model 1	0.529	0.458	7.413	0.586	0.523	9.330	0.443	0.359	5.255
Model 2	0.525	0.453	7.306	0.598	0.537	9.802	0.460	0.378	5.614
Model 3	0.524	0.451	7.251	0.600	0.539	9.895	0.457	0.375	5.558
Model 4	0.526	0.454	7.327	0.599	0.539	9.874	0.463	0.382	5.699
Model 5	0.536	0.466	7.638	0.607	0.548	10.203	0.478	0.399	6.039
Model 6	0.531	0.460	7.481	0.586	0.523	9.338	0.450	0.367	5.398
Model 7	0.514	0.442	7.090	0.578	0.514	9.159	0.430	0.345	5.064
Model 8	0.522	0.451	7.313	0.619	0.562	10.862	0.457	0.376	5.643
Model 9	0.512	0.439	7.028	0.600	0.541	10.060	0.447	0.364	5.415
Model 10	0.507	0.433	6.876	0.599	0.540	10.026	0.430	0.345	5.051
Model 11	0.508	0.435	6.921	0.609	0.550	10.421	0.429	0.343	5.029
Model 12	0.510	0.437	6.984	0.577	0.514	9.131	0.414	0.327	4.741
<b>Category 1</b>									
Model 1	0.552	0.484	8.138	0.540	0.471	7.763	0.441	0.357	5.213
Model 2	0.553	0.485	8.169	0.550	0.482	8.069	0.450	0.367	5.405
Model 3	0.570	0.505	8.754	0.549	0.480	8.024	0.448	0.364	5.355
Model 4	0.573	0.509	8.871	0.553	0.485	8.157	0.452	0.369	5.449
Model 5	0.568	0.503	8.693	0.568	0.502	8.672	0.465	0.384	5.734
Model 6	0.554	0.486	8.195	0.542	0.473	7.812	0.444	0.359	5.265
Model 7	0.537	0.468	7.768	0.539	0.471	7.844	0.418	0.332	4.819
Model 8	0.572	0.508	8.961	0.589	0.527	9.594	0.447	0.365	4.417
Model 9	0.564	0.499	8.658	0.558	0.492	8.455	0.430	0.345	5.063
Model 10	0.565	0.500	8.696	0.557	0.491	8.432	0.424	0.338	4.938
Model 11	0.565	0.500	8.710	0.578	0.515	9.187	0.432	0.347	5.094
Model 12	0.536	0.466	7.732	0.538	0.468	7.787	0.414	0.327	4.742

## Appendix E (Continued)

## Results of OLS Multiple Regression

Variables	Word Index			Unweighted Index			Weighted Index		
	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F
Category 2									
Model 1	0.382	0.288	4.081	0.387	0.294	4.170	0.284	0.176	2.621
Model 2	0.414	0.325	4.662	0.431	0.345	4.999	0.370	0.274	3.872
Model 3	0.464	0.383	5.720	0.476	0.396	5.988	0.385	0.292	4.133
Model 4	0.451	0.368	5.430	0.462	0.381	5.671	0.353	0.255	3.596
Model 5	0.413	0.324	4.648	0.431	0.345	5.009	0.355	0.258	3.638
Model 6	0.379	0.285	4.025	0.384	0.291	4.112	0.267	0.156	2.405
Model 7	0.415	0.328	4.754	0.423	0.337	4.912	0.276	0.168	2.556
Model 8	0.464	0.385	5.811	0.482	0.404	6.224	0.364	0.269	3.830
Model 9	0.483	0.406	6.269	0.492	0.417	6.501	0.354	0.258	3.674
Model 10	0.487	0.410	6.350	0.496	0.420	6.582	0.354	0.258	3.672
Model 11	0.458	0.377	5.655	0.474	0.395	6.029	0.348	0.251	3.575
Model 12	0.414	0.327	4.737	0.422	0.336	4.893	0.269	0.160	2.471
Category 3									
Model 1	0.512	0.438	6.918	0.489	0.411	6.308	0.395	0.304	4.317
Model 2	0.511	0.437	6.908	0.508	0.434	6.825	0.417	0.329	4.722
Model 3	0.529	0.458	7.423	0.523	0.451	7.239	0.427	0.340	4.919
Model 4	0.524	0.452	7.268	0.518	0.445	7.085	0.419	0.331	4.756
Model 5	0.509	0.435	6.846	0.507	0.432	6.786	0.415	0.326	4.677
Model 6	0.512	0.438	6.913	0.489	0.411	6.314	0.392	0.300	4.252
Model 7	0.473	0.394	6.016	0.470	0.390	5.930	0.349	0.252	3.592
Model 8	0.490	0.414	6.449	0.504	0.430	6.819	0.381	0.289	4.128
Model 9	0.502	0.428	6.758	0.511	0.438	7.001	0.388	0.296	4.244
Model 10	0.504	0.430	6.811	0.514	0.441	7.074	0.386	0.294	4.205
Model 11	0.489	0.413	6.409	0.503	0.429	6.784	0.372	0.278	3.966
Model 12	0.473	0.394	6.016	0.470	0.390	5.930	0.346	0.248	3.538

Appendix E (Continued)

Results of OLS Multiple Regression

Variables	Word Index			Unweighted Index			Weighted Index		
	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F	R <sup>2</sup>	Adj.R <sup>2</sup>	F
<b>Category 4</b>									
Model 1	0.179	0.054	1.435	0.228	0.111	1.946	0.152	0.023	1.181
Model 2	0.184	0.061	1.490	0.209	0.089	1.739	0.167	0.041	1.322
Model 3	0.162	0.035	1.279	0.198	0.076	1.629	0.136	0.006	1.042
Model 4	0.149	0.020	1.152	0.198	0.076	1.627	0.126	-0.006	0.952
Model 5	0.167	0.041	1.323	0.202	0.081	1.670	0.151	0.022	1.174
Model 6	0.173	0.048	1.384	0.239	0.124	2.071	0.149	0.020	1.158
Model 7	0.229	0.114	1.989	0.252	0.140	2.258	0.173	0.049	1.400
Model 8	0.204	0.085	1.719	0.222	0.106	1.914	0.162	0.037	1.297
Model 9	0.192	0.071	1.589	0.208	0.090	1.760	0.144	0.016	1.125
Model 10	0.195	0.075	1.626	0.206	0.088	1.739	0.145	0.017	1.132
Model 11	0.209	0.091	1.768	0.225	0.109	1.946	0.163	0.038	1.308
Model 12	0.230	0.115	1.998	0.246	0.134	2.187	0.173	0.049	1.398