Voluntary disclosure of segment information in a regulated environment: Australian evidence

Mui Ching Chan

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VOLUNTARY DISCLOSURE OF SEGMENT INFORMATION IN A REGULATED ENVIRONMENT: AUSTRALIAN EVIDENCE

BY

MUI CHING CHAN

A Thesis Submitted in Partial Fulfillment of the Requirements for the Award of

Master of Business (Accounting)

At the Faculty of Business and Public Management

Edith Cowan University

Date of Submission: 28 February 2003
USE OF THESIS

The Use of Thesis statement is not included in this version of the thesis.
ABSTRACT

This thesis is an empirical examination of the relationship between six firm characteristics, namely: firm size, industry membership, minority interest, financial leverage, firm diversification, ownership diffusion, and voluntary disclosure of segment information in a regulated environment. This study provides empirical evidence that there are incentives for Australian companies with specific firm characteristics to voluntarily disclose segment information in a regulated setting.

The theoretical frameworks employed in this research study are agency theory and contracting theory. Compensation contracts are employed to resolve the potential conflicts of interest between the shareholders and managers giving rise to agency cost of equity. Debt contracts are employed to resolve the bondholders and shareholders/managers conflict giving rise to agency cost of debt. Management may voluntarily disclose additional segment information to reduce these agency costs.

Compensation contracts and debt contracts align the interests of management with those of shareholders and debtholders. Managers are directly rewarded using a variety of compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to maximise firm value under these compensation plans as they may be rewarded with an increase in bonus payments and an increase in the value of their share options.

In information costs (or proprietary costs), there are two forces influencing voluntary disclosure: (i) the cost of providing information and (ii) the corresponding associated benefits. Where there is a demand for private
information by shareholders, debtholders and investors, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value. Managers have incentives to voluntarily disclose additional segment information if there is a net benefit in disclosure.

Certain industries may attract a disproportionate share of scrutiny from government agencies and special interest groups. These companies are more likely to voluntarily disclose additional segment information to reduce the likelihood of political costs. Political considerations include managers' concern about attracting explicit and implicit taxes, or regulatory actions.

The six hypotheses in this thesis focus on a test of the contracting theory and agency theory. The firm size and firm diversification hypotheses are used as a test of the contracting theory, information costs. The industry membership hypothesis is employed to test the contracting theory, political costs. The minority interest, financial leverage and ownership diffusion hypotheses are used as a test of the agency theory.

This study is based on a sample of 185 companies listed on the Australian Stock Exchange top 300 shares. Univariate and multivariate tests were performed on the six hypotheses in this thesis. The univariate test results provide evidence to support voluntary segment disclosure is significantly related to firm diversification, minority interest and financial leverage but no support was found for firm size, ownership diffusion and industry membership. The bivariate logistic regression test results found statistically significant support that voluntary disclosure of segment information in a regulated environment is related to firm diversification and firm size. No support was found for minority interest, financial leverage, ownership diffusion and industry membership.
DECLARATION

“I certify that this thesis does not incorporate without acknowledgement 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; and it does not contain any defamatory material”.

Signature.

Date: 28 February 2003
ACKNOWLEDGMENTS

I wish to express my sincere appreciation and gratitude to Associate Professor Colin Dolley, my thesis supervisor, for his guidance and direction which enabled me to achieve far more than I expected.

My sincere appreciation and gratitude also goes to Associate Professor Peter Standen, my business research methods lecturer, for his support throughout my graduate program.

Finally, my special love and thanks I give to my mother, Fock Siew Yoke, and my father, Chan See Kai, to whom this dissertation is dedicated. They have displayed such love, support, understanding, patience and made such sacrifices that mere words cannot fully express my gratitude, appreciation and love for them.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Abstract</th>
<th>i</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>iv</td>
</tr>
</tbody>
</table>

## CHAPTER

<table>
<thead>
<tr>
<th>INTRODUCTION</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Motivation for the study</td>
<td>1</td>
</tr>
<tr>
<td>1.2.1 Firm diversification</td>
<td>4</td>
</tr>
<tr>
<td>1.2.2 The concept of a highly diversified company</td>
<td>5</td>
</tr>
<tr>
<td>1.3.1 Voluntary disclosure of segment information in a regulated environment</td>
<td>10</td>
</tr>
<tr>
<td>1.3.2 The measurement of voluntary disclosure</td>
<td>10</td>
</tr>
<tr>
<td>1.4.1 The Australian Accounting Standards Board (AASB) and segment reporting</td>
<td>15</td>
</tr>
<tr>
<td>1.4.2 Revised AASB 1005</td>
<td>15</td>
</tr>
<tr>
<td>1.4.3 The major changes introduced by the revised AASB 1005</td>
<td>17</td>
</tr>
<tr>
<td>1.5 Research question</td>
<td>18</td>
</tr>
<tr>
<td>1.6 The significance of this research study</td>
<td>19</td>
</tr>
<tr>
<td>1.7.1 Research summary</td>
<td>21</td>
</tr>
<tr>
<td>1.7.2 The variables</td>
<td>21</td>
</tr>
<tr>
<td>1.7.3 The hypotheses</td>
<td>23</td>
</tr>
<tr>
<td>1.7.4 The research methodology</td>
<td>24</td>
</tr>
<tr>
<td>1.8 Chapter outline</td>
<td>26</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LITERATURE REVIEW</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Introduction</td>
<td>28</td>
</tr>
</tbody>
</table>
2.2.1 Bradbury (1992) 29
2.2.2 McKinnon and Dalimunthe (1993) 31
2.2.3 Kelly (1994) 34
2.2.4 Mitchell, Chia and Loh (1995) 36
2.2.5 Aitken, Hooper and Pickering (1997) 38
2.3 Motivation for this study 39
2.4 Summary 41

3 THEORY DEVELOPMENT AND HYPOTHESES FORMULATION 44
3.1 Introduction 44
3.2.1 Agency theory 45
3.2.2 Contracting theory 46
3.3 Agency costs, information costs, political costs and voluntary disclosure 50
3.4 Hypotheses formulation 54
3.5.1 Firm size hypothesis 55
3.5.2 Industry membership hypothesis 56
3.5.3 Minority interest hypothesis 57
3.5.4 Financial leverage hypothesis 58
3.5.5 Firm diversification hypothesis 59
3.5.6 Ownership diffusion hypothesis 61
3.6 Summary 62

4 RESEARCH METHODOLOGY 64
4.1 Introduction 64
4.2 The research design 64
4.3 The sample selection 66
4.4 The data collection 70
4.5 The measurement of the variables 71
4.6 Disclosure 71
4.7.1 Firm size 72
4.7.2 Industry membership 73
4.7.3 Minority interest 74
4.7.4 Financial leverage 75
4.7.5 Firm diversification 76
4.7.6 Ownership diffusion 78
4.8 Summary 78

5 RESULTS 80
5.1 Introduction 80
5.2 Analysis of the results 80
5.3 Descriptive statistics of the continuous variables 81
5.4.1 Univariate test results 82
5.4.2 Comparison of the univariate test results 84
5.4.3 Discussion of the univariate test results 85
5.5 Correlation matrix for the continuous variables 86
5.6.1 Multivariate test results 87
5.6.2 Discussion of the multivariate test results 90
5.6.3 Additional Binary Logistic Regression Test 92
5.6.4 Comparison of the multivariate test results between this thesis and previous studies 93
5.6.5 Discussion of the multivariate test results of this thesis in comparison to previous studies 94
5.7 Summary 97
# CONCLUSIONS

## 6.1 Introduction

## 6.2 Motivation for the study

### 6.2.1 Firm diversification

### 6.2.2 The measurement for voluntary disclosure

## 6.3 Theory development

### 6.3.1 Theory development

### 6.3.2 Agency costs and compensation contracts

### 6.3.3 Information costs and voluntary disclosure

### 6.3.4 Political costs and voluntary disclosure

## 6.4 Hypotheses formulation

## 6.5 Research methodology

### 6.5.1 The research methodology

### 6.5.2 The research design

### 6.5.3 The sample selection

### 6.5.4 The data collection

## 6.6 The hypotheses tests

### 6.7 Findings of the study

#### 6.7.1 Findings of the study

#### 6.7.2 Discussion of the univariate test findings

#### 6.7.3 Comparison of the univariate test findings with prior studies

#### 6.7.4 Discussion of the multivariate test findings

#### 6.7.5 Comparison of the multivariate test findings with prior studies

## 6.8 Contributions of the study

## 6.9 Limitations and suggestions for further research

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**ENDNOTES**

**REFERENCES**
Chapter 1

Introduction

1.1 Motivation for the Study

This thesis investigates and ascertains whether Australian companies provide voluntary disclosure of segment information data over and above the requirements of the accounting standard AASB 1005 Financial Reporting by Segments. The objective of this research study is to examine the firm characteristics associated with voluntarily segment disclosure and the economic incentives that motivate management’s disclosure decisions. This study has been conducted in a regulated setting after the introduction of Australian Accounting Standard AAS 16 and Accounting Standard AASB 1005 Financial Reporting by Segments effective on or after 31st March 1985 and 30th June 1986 respectively but before the implementation of the revised Accounting Standard AASB 1005 Segment Reporting effective on or after 1st July 2001.

Prior research studies in voluntary disclosure of segment data by McKinnon and Dalimunthe (1993), Kelly (1994), Mitchell, Chia and Loh (1995) and Aitken, Hooper and Pickering (1997) suggest that companies with particular firm characteristics have economic incentives for voluntary disclosure of segment data. These prior research studies were conducted in an unregulated setting.

The examination of economic incentives motivating voluntary disclosure of additional segment information is based on the hypotheses that
this disclosure is expected to be greater for firms with particular firm characteristics such as firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion. These firms, it is argued, have incentives to voluntarily disclose segment information over and above that required by AASB 1005 because of benefits such as reduced agency costs and political costs.

The thesis uses an economic incentives framework to examine six firm specific characteristics that may affect the utility of segment information and voluntary disclosure of additional segment information data. These firm characteristics are firm size, industry membership, minority interest, financial leverage, firm diversification and ownership diffusion.

The prior research studies by McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) found no support for the firm diversification variable. This unexpected result motivated a new conception and measurement of the firm diversification variable in this thesis. Highly diversified firms are firms that have diversified into different industry segments and/or geographical segments. This is an objective measure as the level of firm diversification can be assessed from the segment information provided in the company's annual reports.

This variable is of particular significance in this thesis as firm diversification is likely to be an important attribute in management's decision to provide voluntary disclosure of additional segment information in a regulated environment. This is because highly diversified firms are likely to have more significant information content for investors. These firms are more likely to disclose private information for which there is a demand, provided there is a net benefit in the voluntary disclosure to the firms.
McKinnon and Dalimunthe (1993) investigated the role of diversification into related and unrelated industries in voluntary disclosure and found no support for this variable. This study examines whether highly diversified firms are more likely to voluntarily disclose segment data compared to firms that are not highly diversified. The findings may add to our understanding of the importance of the role of firm diversification in voluntary disclosure of segment information.

This research study is important or significant to undertake as it would contribute to theory development and practical consequences. The study employs the minority interest, financial leverage and ownership diffusion hypotheses to test agency theory and the firm size, firm diversification and industry membership hypotheses to test contracting theory in relation to voluntary segment disclosure. It forms a link between agency costs, information costs, political costs (contracting costs) and the accounting policy choice of voluntary disclosure decisions.

This study would contribute in the theory development of information costs (proprietary costs) of competitive disadvantage to explain the incentives behind management's decision to voluntarily disclose segment data in a regulated setting. In particular, the firm size and firm diversification hypotheses highlight the role played by (contracting theory) information costs on voluntary segment disclosure.

The empirical results would provide a contribution to the voluntary corporate disclosure literature, highlighting the significance of the role of proprietary costs of competitive disadvantage on voluntary disclosure of segment information. Finally, the empirical results would have practical consequences for the users of financial statements, especially the shareholders, management, debtholders, investors, financial analysts, regulators and researchers.
1.2.1 Firm Diversification

The most important hypothesis of this research study is the firm diversification variable. After the introduction of the segment reporting accounting standards AAS 16 and AASB 1005 effective on or after 31st March 1985 and 30th June 1986 respectively, it became possible to access the disaggregated sales, earnings and assets by industry and geographical segments. Firm diversification by industry and geographical segments can also be ascertained from the segment reporting information disclosed in the companies' annual financial statements.

Firm diversification can be classified into two major categories, namely: diversification into different industries and diversification into different geographical areas. The number of industry segments that a firm operated in measures the level of diversification. For example, a firm that operated in six industry segments would be considered to be at a higher level of diversification than a firm that operated in three industry segments.

The number of geographical segments that a firm operated in also measures the level of diversification. For example, a firm that operated in five geographical segments would be considered to be at a higher level of diversification than a firm that operated in two geographical segments.

Since a firm can be highly diversified in industry segments and, or, geographical segments, the highly diversified firms variable in this thesis is measured by the number of industry segments or the number of geographical segments, whichever is the higher number of segments².

Through the eyes of the internal management of the company, with regards to segmental reporting, there is a dominant or primary segment. The
dominant or primary segment can be either the industry segments or geographic segments. The revised AASB 1005 *Segment Reporting* prescribes a primary segment (either business segments or geographic segments) and a secondary segment. In this study, firm diversification is measured based on the number of segments in the dominant segment of the company.

1.2.2 The Concept of a Highly Diversified Company

The conception of a highly diversified company is a firm that is either highly diversified in terms of industry segments or geographical segments.

Table 1 is an illustration of a highly diversified company based on diversification in industry segments. This company has diversified into five industry segments:

i) Rural services and insurance  
ii) Fertilisers and chemicals  
iii) Energy  
iv) Hardware and forest products  
v) Other – investments and services  

The consolidated entity operates predominantly in Australia, that is, in one geographical segment. The highly diversified firms variable measured by the number of segments in this company is recorded as five.

Table 2 is an illustration of a highly diversified company based on diversification in geographical segments. This company has diversified into five geographical segments: Australia, New Zealand, United States, Japan and Other. The economic entity operates in one industry segment. The highly diversified firms variable in this company is measured and recorded as five.
Table 1
Illustration of Highly Diversified Firms Concept displaying Diversification in Industry Segments

<table>
<thead>
<tr>
<th>Industry Segments</th>
<th>Operating Revenue 2000 $000</th>
<th>Segment Assets 2000 $000</th>
<th>Earnings Before Tax 2000 $000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural services and insurance</td>
<td>847,652</td>
<td>598,781</td>
<td>40,144</td>
</tr>
<tr>
<td>Fertilisers and chemicals</td>
<td>403,146</td>
<td>548,140</td>
<td>45,115</td>
</tr>
<tr>
<td>Energy</td>
<td>588,756</td>
<td>946,265</td>
<td>107,460</td>
</tr>
<tr>
<td>Hardware and forest products</td>
<td>1,498,391</td>
<td>861,686</td>
<td>139,977</td>
</tr>
<tr>
<td>Other – investments and services</td>
<td>164,612</td>
<td>346,798</td>
<td>29,666</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,502,557</td>
<td>3,301,670</td>
<td>362,362</td>
</tr>
<tr>
<td>Consolidated adjustments</td>
<td>(6,784)</td>
<td>(132,910)</td>
<td>(6,692)</td>
</tr>
<tr>
<td>Interest paid and corporate overheads</td>
<td></td>
<td></td>
<td>(58,911)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3,495,773</td>
<td>3,168,760</td>
<td>296,759</td>
</tr>
</tbody>
</table>

The consolidated entity operates predominantly in Australia.

Table 2
Illustration of Highly Diversified Firms Concept displaying Diversification in Geographical Segments

<table>
<thead>
<tr>
<th>Geographical Segments</th>
<th>Australia 2000 $000</th>
<th>New Zealand 2000 $000</th>
<th>United States 2000 $000</th>
<th>Japan 2000 $000</th>
<th>Other 2000 $000</th>
<th>Eliminations 2000 $000</th>
<th>Consolidated 2000 $000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue outside the consolidated entity</td>
<td>9,247</td>
<td>4,854</td>
<td>7,421</td>
<td>2,745</td>
<td>124</td>
<td>--</td>
<td>24,391</td>
</tr>
<tr>
<td>Inter-segment revenue</td>
<td>--</td>
<td>10,754</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>(10,754)</td>
</tr>
<tr>
<td>Total revenue</td>
<td>9,247</td>
<td>15,608</td>
<td>7,421</td>
<td>2,745</td>
<td>124</td>
<td>(10,754)</td>
<td>24,391</td>
</tr>
<tr>
<td>Segment earnings before interest, tax, depreciation and amortisation</td>
<td>636</td>
<td>1,086</td>
<td>2,425</td>
<td>(66)</td>
<td>(937)</td>
<td>254</td>
<td>3,398</td>
</tr>
<tr>
<td>Segment operating profit / (loss) after tax</td>
<td>593</td>
<td>470</td>
<td>(276)</td>
<td>(141)</td>
<td>(962)</td>
<td>254</td>
<td>(62)</td>
</tr>
<tr>
<td>Total assets</td>
<td>79,817</td>
<td>24,855</td>
<td>54,270</td>
<td>3,962</td>
<td>283</td>
<td>(80,080)</td>
<td>83,107</td>
</tr>
</tbody>
</table>

The economic entity operates in one industry, being the design, development, integration and support of telecommunications systems and products.

Note. Source: Telemedia Networks International 2000 Segment Information Disclosures.
Table 3 is an illustration of a highly diversified company that has diversified into different industry and geographical segments. This company has diversified into six industry segments and four geographical segments. The industry segments are:

i) Business Services  
ii) Healthcare Services  
iii) Education Services  
iv) Tourism & Leisure Services  
v) Resources & Government Services  
vi) Plastics

The geographical segments are:

i) Australia  
ii) New Zealand  
iii) United States of America  
iv) Hong Kong

The highly diversified firms variable of this company (measured by the number of industry segments or geographical segments, whichever is the higher number of segments) is recorded as six.
Table 3
Illustration of Highly Diversified Firms Concept displaying Diversification in Industry Segments and Geographical Segments

<table>
<thead>
<tr>
<th>Industry Segments</th>
<th>Revenue $000</th>
<th>Operating Profit $000</th>
<th>Total Assets $000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Services</td>
<td>388,742</td>
<td>20,528</td>
<td>157,344</td>
</tr>
<tr>
<td>Healthcare Services</td>
<td>449,732</td>
<td>10,861</td>
<td>149,343</td>
</tr>
<tr>
<td>Education Services</td>
<td>103,963</td>
<td>5,296</td>
<td>22,788</td>
</tr>
<tr>
<td>Tourism &amp; Leisure Services</td>
<td>236,224</td>
<td>6,954</td>
<td>80,203</td>
</tr>
<tr>
<td>Resources &amp; Government Services</td>
<td>268,629</td>
<td>14,336</td>
<td>61,867</td>
</tr>
<tr>
<td>Plastics</td>
<td>138,945</td>
<td>26,750</td>
<td>65,046</td>
</tr>
<tr>
<td>Total Industry Segments</td>
<td>1,586,235</td>
<td>84,725</td>
<td>536,591</td>
</tr>
<tr>
<td>Goodwill</td>
<td>(6,741)</td>
<td></td>
<td>255,076</td>
</tr>
<tr>
<td>Interest paid</td>
<td>(11,094)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and loans</td>
<td>338</td>
<td></td>
<td>43,246</td>
</tr>
<tr>
<td></td>
<td>1,586,573</td>
<td>66,890</td>
<td>834,913</td>
</tr>
</tbody>
</table>

Geographical Segments

<table>
<thead>
<tr>
<th></th>
<th>Revenue $000</th>
<th>Operating Profit $000</th>
<th>Total Assets $000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1,257,472</td>
<td>43,574</td>
<td>417,329</td>
</tr>
<tr>
<td>New Zealand</td>
<td>182,413</td>
<td>12,995</td>
<td>53,764</td>
</tr>
<tr>
<td>United States of America</td>
<td>96,969</td>
<td>11,703</td>
<td>56,452</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>49,381</td>
<td>16,453</td>
<td>9,046</td>
</tr>
<tr>
<td>Total Geographical Segments</td>
<td>1,586,235</td>
<td>84,725</td>
<td>536,591</td>
</tr>
<tr>
<td>Goodwill</td>
<td>(6,741)</td>
<td></td>
<td>255,076</td>
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<tr>
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</tr>
<tr>
<td></td>
<td>1,586,573</td>
<td>66,890</td>
<td>834,913</td>
</tr>
</tbody>
</table>

Note. Source: Spotless Group 2000 Segment Information Disclosures.
1.3.1 Voluntary Disclosure of Segment Information in a Regulated Environment

The voluntary disclosure of segment information by companies in a regulated Australian environment has not been investigated in the prior Australian research studies. It is a different aspect of voluntary disclosure as the companies are already disclosing segment information data to comply with the segment reporting accounting standards.

1.3.2 The Measurement of Voluntary Disclosure

In this thesis a sample of 200 Australian companies were examined to ascertain if these companies provided voluntary disclosure of segment information data.

When a company complied with the accounting standards and displayed the mandated three segment data items (segment revenue, segment results and segment assets) in the industry segments and/or geographical segments, it is measured and recorded as a “non-voluntary disclosure” company. A company operating in one industry and one geographical segment is also measured and recorded as a “non-voluntary disclosure” company.

When a company displayed segment items in excess of the mandated three segment data items, such as inter-segment sales, other revenue, abnormal items, depreciation and amortisation, capital expenditure, segment liabilities and segment net assets in the industry segments and/or geographical segments, it is measured and recorded as a “voluntary disclosure” company.

Table 4 is an illustration of a company that displayed non-voluntary disclosure of segment information. The company displayed details of industry
segments and geographical segments. The consolidated entity operated in five industry segments and six geographical segments. The mandated three segment data items: segment revenue, segment result and segment assets are displayed in both the industry segments and geographical segments.

Table 5 is an illustration of voluntary disclosure of segment information in the industry segments. The company displayed details of industry segments and geographical segments. The consolidated entity operated in six industry segments and four geographical segments. Voluntary disclosure of segment information was displayed in the industry segments. A total of five segment data items were displayed in the industry segments:

i) Total assets at year end
ii) Total operating revenue
iii) Inter-segment sales
iv) Net external operating revenue
v) Operating profit before income tax

The mandated three segment data items were displayed in the geographical segments.

Table 6 is an illustration of voluntary disclosure of segment information in the geographical segments. The company displayed details of geographical segments. The consolidated entity operated in four geographical segments and one industry segment. Voluntary disclosure of segment information was displayed in the geographical segments. A total of six segment data items were displayed in the geographical segments:

i) Sales to customers outside the consolidated entity
ii) Inter-segment sales
iii) Other revenue
iv) Total revenue
v) Operating profit before income tax
vi) Segment assets
Table 4

Illustration of a “non-voluntary disclosure” company

Details of industry segments are as follows:

<table>
<thead>
<tr>
<th>Industry Segment</th>
<th>Sales revenue $M</th>
<th>Total assets $M</th>
<th>Segment profit $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gold</td>
<td>936.0</td>
<td>2,445.9</td>
<td>198.3</td>
</tr>
<tr>
<td>Metals</td>
<td>178.1</td>
<td>428.8</td>
<td>26.6</td>
</tr>
<tr>
<td>Industrial minerals</td>
<td>179.7</td>
<td>101.0</td>
<td>11.8</td>
</tr>
<tr>
<td>Power and gas</td>
<td>62.5</td>
<td>44.5</td>
<td>3.1</td>
</tr>
<tr>
<td>Finance and corporate</td>
<td>--</td>
<td>606.0</td>
<td>(101.4)</td>
</tr>
<tr>
<td><strong>Inter-segment eliminations</strong></td>
<td><strong>(32.7)</strong></td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td><strong>Abnormal items</strong></td>
<td>--</td>
<td>--</td>
<td>(420.7)</td>
</tr>
<tr>
<td><strong>Consolidated total</strong></td>
<td>1,356.3</td>
<td>3,626.2</td>
<td>138.4</td>
</tr>
</tbody>
</table>

Details of geographical segments are as follows:

<table>
<thead>
<tr>
<th>Geographical Segment</th>
<th>Sales revenue $M</th>
<th>Total assets $M</th>
<th>Segment profit $M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>1,187.1</td>
<td>2,564.8</td>
<td>157.5</td>
</tr>
<tr>
<td>Asia</td>
<td>23.9</td>
<td>5.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Europe</td>
<td>46.5</td>
<td>358.2</td>
<td>(41.4)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>43.8</td>
<td>86.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Africa</td>
<td>20.3</td>
<td>246.7</td>
<td>11.3</td>
</tr>
<tr>
<td>North and South America</td>
<td>2.0</td>
<td>364.1</td>
<td>4.4</td>
</tr>
<tr>
<td><strong>Consolidated total</strong></td>
<td>1,323.6</td>
<td>3,626.2</td>
<td>138.4</td>
</tr>
</tbody>
</table>

| Inter-segment eliminations | --              | --              | --                |
| Abnormal items             | --              | --              | (420.7)           |
| **Consolidated total**     | 1,323.6          | 3,626.2         | (282.3)           |

*Note.* Source: Normandy Mining 2000 Segment Information Disclosures.
Table 5

Illustration of a “voluntary disclosure” company displaying voluntary disclosure of segment information in the Industry segments

<table>
<thead>
<tr>
<th>Industry segments</th>
<th>Total assets at year end</th>
<th>Total operating revenue</th>
<th>Inter-segment sales</th>
<th>Net external operating income</th>
<th>Operating profit before income tax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000 $m</td>
<td>2000 $m</td>
<td>2000 $m</td>
<td>2000 $m</td>
<td>2000 $m</td>
</tr>
<tr>
<td>Beer – Australian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>– International</td>
<td>1,726.3</td>
<td>1,433.9</td>
<td>(76.5)</td>
<td>1,357.4</td>
<td>384.6</td>
</tr>
<tr>
<td>Leisure and hospitality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Carlton business activities</td>
<td>205.3</td>
<td>180.7</td>
<td></td>
<td>180.7</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td>769.8</td>
<td>873.8</td>
<td></td>
<td>873.8</td>
<td>110.2</td>
</tr>
<tr>
<td>Wine</td>
<td>128.3</td>
<td>110.5</td>
<td>(19.2)</td>
<td>91.3</td>
<td>9.9</td>
</tr>
<tr>
<td></td>
<td>1,543.7</td>
<td>718.1</td>
<td>(5.9)</td>
<td>712.2</td>
<td>154.3</td>
</tr>
<tr>
<td>Property and investments</td>
<td>209.2</td>
<td>142.6</td>
<td></td>
<td>142.6</td>
<td>29.4</td>
</tr>
<tr>
<td>Corporate</td>
<td>518.8</td>
<td>50.1</td>
<td></td>
<td>50.1</td>
<td>(44.3)</td>
</tr>
<tr>
<td></td>
<td>5,101.4</td>
<td>3,509.7</td>
<td>(101.6)</td>
<td>3,408.1</td>
<td>650.7</td>
</tr>
<tr>
<td>Unallocated net interest expense</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>65.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>585.7</td>
</tr>
<tr>
<td>Geographical segments</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia and Pacific</td>
<td>4,045.3</td>
<td>2,993.4</td>
<td>589.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td>112.5</td>
<td>81.7</td>
<td>(3.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>675.0</td>
<td>195.5</td>
<td>43.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Americas</td>
<td>268.6</td>
<td>137.5</td>
<td>22.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5,101.4</td>
<td>3,408.1</td>
<td></td>
<td>650.7</td>
<td></td>
</tr>
</tbody>
</table>

*Note.* Source: Foster’s Brewing Group 2000 Segment Information Disclosures.
Table 6
Illustration of a “voluntary disclosure” company displaying voluntary disclosure of segment information in the Geographical Segments
(a) Industry Segments
The activities of the entities in the consolidated entity are predominantly within a single industry, which is the development, manufacture, distribution and service of gaming machines and systems and the importation and distribution of electronic components and coin counting machines.
(b) Geographical Segments

<table>
<thead>
<tr>
<th></th>
<th>Australia $'000</th>
<th>New Zealand $'000</th>
<th>United States of America $'000</th>
<th>Other $'000</th>
<th>Inter-segment elimination $'000</th>
<th>Consolidated $'000</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months ended 31/12/00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales to customers outside the consolidated entity</td>
<td>372,390</td>
<td>37,301</td>
<td>97,095</td>
<td>26,685</td>
<td>(50,196)</td>
<td>533,471</td>
</tr>
<tr>
<td>Inter-segment sales</td>
<td>50,196</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>(50,196)</td>
<td>-</td>
</tr>
<tr>
<td>Other revenue</td>
<td>12,989</td>
<td>871</td>
<td>7,462</td>
<td>240</td>
<td>(6,000)</td>
<td>15,562</td>
</tr>
<tr>
<td>Total revenue</td>
<td>435,575</td>
<td>38,172</td>
<td>104,557</td>
<td>26,925</td>
<td>(56,196)</td>
<td>549,033</td>
</tr>
<tr>
<td>Operating profit before income tax</td>
<td>88,464</td>
<td>1,667</td>
<td>11,320</td>
<td>2,491</td>
<td>(6,438)</td>
<td>97,504</td>
</tr>
<tr>
<td>Segment assets</td>
<td>279,177</td>
<td>2,820</td>
<td>51,354</td>
<td>12,904</td>
<td>(17,310)</td>
<td>328,945</td>
</tr>
</tbody>
</table>

Note. Source: Aristocrat Leisure 2000 Segment Information Disclosures.
1.4.1 The Australian Accounting Standards Board (AASB) and Segment Reporting

Australian Accounting Standards AAS 16 *Financial Reporting by Segments* was issued in March 1984 and Applicable Accounting Standards AASB 1005 *Financial Reporting by Segments* was issued in April 1986.

The standards require three principal items of information to be disclosed for both industry segments and geographical segments:

i) Segment revenue (distinguishing between revenues derived from customers outside the entity and revenues derived from other segments)

ii) Segment result (the difference between segment revenues and segment expenses)

iii) Segment assets (the amount the asset is recorded in the accounting records at a particular date)

1.4.2 Revised AASB 1005

The revised segment reporting accounting standard AASB 1005 *Segment Reporting* conforms to the revised International Accounting Standard IAS 14 *Segment Reporting*. The new AASB 1005 will significantly change the way many entities report segment information for annual reporting periods beginning on or after 1st July 2001. The revised standard requires disclosure of information relating to business and geographical segments rather than industry and geographical segments.

The objective of the revised standard is for externally reported segment information to be presented on a similar basis as information reported
internally for management purposes. The internal organisational and management structure and internal financial reports to the chief executive officer and the board of directors (or the level of management where decisions as to the overall resource allocation of the business occurs) should be the starting point for identifying business and geographical segments and primary and secondary formats.

The revised AASB 1005 provides more guidance on how to identify business and geographical segments which are defined on the basis of distinguishable components of an entity with differing risks and returns. The revised standard will require entities to identify their reportable business and geographical segments and determine which basis of segmentation is primary based on the differing profitability, opportunities for growth, future prospects and risks they face as a result of the products and services they provide or the geographical areas in which they operate.

Business segments will be an entity's primary segment reporting format if its risks and returns are predominantly affected by differences in the products and services it provides rather than differences in the geographical areas in which it operates. This means less extensive secondary segment disclosures will be required for its reportable geographical segments.

On the other hand, geographical segments must be reported in the primary format if an entity's risks and returns are predominantly affected by its operations in different countries or geographical areas. In this case disclosures for its reportable business segments can be provided in the less extensive secondary format.
1.4.3 The Major Changes in the Revised AASB 1005

The new AASB 1005 requires the entity to distinguish between primary and secondary segments on the basis of whether the entity’s risks and returns are predominantly affected by differences in the products and services the entity provides or by the geographical areas in which it operates (i.e. its business or geographical segments).

The entity is required to provide more extensive disclosure for reportable primary segments as compared to secondary segments, including the following new disclosures for primary segments:

i) segment liabilities

ii) acquisitions of segment assets that are expected to be used during more than one annual reporting period (e.g. property, plant and equipment)

iii) depreciation and amortisation expense

iv) other non-cash expenses included in segment expenses

v) the share of the net profit or loss of associates, joint ventures or other investees accounted for by the equity method of accounting, if substantially all of the investees’ operations are within the segment, and the aggregate carrying amount of those investments, and

vi) reconciliations of total segment liabilities to total entity liabilities.

The entity is required to provide less extensive disclosure for secondary segments, including information about segment revenues, segment assets and acquisitions of segment assets that are used for more than one annual reporting period.
1.5 Research Question

AAS 16 and AASB 1005 Financial Reporting by Segments became effective on or after 31st March 1985 and 30th June 1986 respectively. Prior to the introduction of the segment reporting accounting standards, research studies on voluntary segment information disclosure were conducted in an unregulated setting.

The revised AASB 1005 Segment Reporting is effective on or after 1st July 2001. As a result of the changes in the segment reporting regulations, this thesis will be conducted in an Australian context after the introduction of AAS 16 and AASB 1005 but prior to the introduction of the revised AASB 1005. Data will be collected from the companies' annual reports for the year ended during the calendar year 2000.

The research study addresses the following research question:

What are the firm characteristics that motivate voluntary disclosure of segment information by Australian companies in a regulated setting?

It is argued that firms with particular firm characteristics have incentives to voluntarily disclose segment information over and above that required by AASB 1005 Financial Reporting by Segments because of benefits such as reduced contracting costs. This thesis uses an economic incentives framework to examine the relationship between six firm characteristics, namely, firm size, industry membership, minority interest, financial leverage, firm diversification, ownership diffusion, and voluntary disclosure of segment information in a regulated setting.
1.6 The Significance of This Research Study

The objective of this thesis is to examine and ascertain whether Australian companies have economic incentives to voluntarily disclose additional segment information over and above that required by the old AASB 1005 *Financial Reporting by Segments*.

This study differs from prior Australian voluntary segment disclosure studies in the following ways:

First, prior studies were conducted in an unregulated setting. This study will be conducted in a regulated setting after the introduction of the segment reporting accounting standards AAS 16 and AASB 1005 effective on or after 31st March 1985 and 30th June 1986 respectively. This is significant as the measurement of voluntary disclosure of segment information can be uniformly and objectively measured from the segment information disclosed by the firms. More importantly, the highly diversified firms variable can be objectively measured from the companies’ segment reporting information in a regulated environment.

Second, the hypotheses in the McKinnon and Dalimunthe (1993) study were re-investigated by Mitchell, Chia and Loh (1995) using a different sample of firms and a bigger sample size. Aitken, Hooper and Pickering (1997) re-examined the hypotheses in the McKinnon and Dalimunthe study using the same sample of firms but with an alternative definition of the diversification variable. This thesis employs a bigger sample size, a different sample of firms, a new conception and measurement of the firm diversification variable, and a different measurement for the voluntary disclosure of segment data.

The sample of firms selected for the testing of the hypotheses differs from the sample of firms in prior studies. The sample of firms in this study
will comprise of 185 of the largest Australian publicly traded companies by market capitalisation listed in *Personal Investor* Top 300 Shares during 2001.

The firm diversification variable is different from the diversification into related versus unrelated industries variable in the prior studies. The firm diversification variable developed in this study is used to test whether the management of companies with higher levels of diversification are more likely to voluntarily disclose segment information than companies with lower levels of diversification.

The voluntary disclosures examined in prior studies were based on the disclosure of three important segment data items, namely: sales, earnings and assets. Voluntary disclosure in this study will be classified on the basis of segment items in excess of the mandated three segment data items (segment revenue, segment result and segment assets).

The findings will contribute to the knowledge and understanding of voluntary segment information disclosure as comparisons can be made between the results of this study conducted under a regulated setting with the results of prior studies conducted under an unregulated setting. If the firm characteristics for voluntary disclosure in this study are generally similar to those in the prior studies, it is an indication that firms with specific firm characteristics will voluntarily disclose segment information in a regulated environment or an unregulated environment.

The findings of the thesis would add to an understanding of firm characteristics and management's economic incentives for voluntary segment disclosure in a regulated environment. The significance of this thesis is in the practical implications of the research findings and its value to the regulators. Accounting policy makers deliberating on mandatory disclosure issues may consider the existence of corporate incentives to disclose information.
1.7.1 Research Summary

This thesis examines the relationship between six firm characteristics and voluntary disclosure of segment information in a regulated setting. There were implications from the literature review of the previous studies that further research can be undertaken to re-examine the six hypotheses in the McKinnon and Dalimunthe (1993) study in a regulated environment after the introduction of AAS 16 and AASB 1005 *Financial Reporting by Segments* effective on or after 31st March 1985 and 30th June 1986 respectively but before the implementation of the revised AASB 1005 *Segment Reporting* effective on or after 1st July 2001.

The examination of economic incentives motivating voluntary disclosure of segment information in a regulated setting is based on the hypotheses that this disclosure is expected to be greater for firms with particular firm characteristics such as firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion. These firms, it is argued, have incentives to voluntarily disclose segment data because of benefits such as reduced agency costs and political costs.

This thesis is motivated by the opportunity to study the effects of a different sample of firms, a larger sample size, a different measure for firm diversification, and a regulated setting on voluntary disclosure of financial segment data.

1.7.2 The Variables

The variables that were used in this study included the dependent variable of voluntary disclosure of segment information and the six
independent variables of firm size, industry membership, minority interest, financial leverage, firm diversification and ownership diffusion. Further discussions and characteristics of these variables are provided in Chapter 3 and the justification for the measurements of these variables are provided in Chapter 4. A brief definition of each of these variables are provided below:

(i) Voluntary disclosure of segment disclosure
Voluntary disclosure of segment information is the disclosure of additional segment information data over and above the mandated three items of segment revenue, segment result and segment assets.

(ii) Firm Size
Firm size is the size of the economic entity measured by the total assets of the consolidated entity.

(iii) Industry Membership
Industry membership is defined as companies belonging to the same industry classification. Industry membership is represented by the resources industry comprising of gold, other metals, diversified resources and energy.

(iv) Minority Interest
Minority interest is defined as the shares in the subsidiaries of the economic entity that is held by outside shareholders.

(v) Financial Leverage
Financial leverage is defined as the ratio of debt : equity + debt or
\[
\frac{\text{debt}}{\text{equity + debt}}
\]
(vi) Firm Diversification

Firm diversification is defined as the diversification of a company into different industry segments or geographical segments. The number of industry segments or geographical segments that the company operated in is the measure for the level of firm diversification.

(vii) Ownership Diffusion

Ownership diffusion is defined as the level (percentage) that the shares are widely held by the shareholders of the company.

1.7.3 The Hypotheses

The hypotheses to be tested in this thesis are as follows:

H1: Larger Australian companies are more likely to voluntarily disclose additional segment information than smaller companies.

H2: Australian companies in the mining and oil industries are more likely to voluntarily disclose additional segment information than companies that are not in the mining and oil industries.

H3: Australian companies with higher levels of minority interest in their subsidiary companies are more likely to voluntarily disclose additional segment information than companies with lower levels of minority interest.

H4: Australian companies with higher levels of leverage are more likely to voluntarily disclose additional segment information than such companies with lower levels of leverage.
H5: Australian companies with higher levels of diversification are more likely to voluntarily disclose additional segment information than companies with lower levels of diversification.

H6: Australian companies with widely held shareholdings are more likely to voluntarily disclose additional segment information than such companies with closely held shareholdings.

The theory development and formulation of these hypotheses are discussed in Chapter 3.

1.7.4 The Research Methodology

The research methodology comprised of the sample selection, data collection and the research design. The initial sample consisted of 200 companies derived from the Australian Stock Exchange top 300 companies ranked by market capitalisation in 2001 Personal Investor Top 300 Shares. Two hundred annual reports for the calendar year ended 2000 were hand collected. Fifteen companies comprising banks and foreign incorporated companies were excluded to arrive at a final sample size of 185 companies.

Once the sample was finalised, each annual report was analysed to collect the data required to test the hypotheses and a data sheet based on the research model was completed. A survey of the 185 final sample companies in the data sheet revealed 65 companies are “voluntary disclosure” firms and 120 companies are “non-voluntary disclosure” firms.

Both univariate and multivariate tests were used to examine the hypotheses. The univariate tests performed were the independent samples t-
test, a chi-square test for the categorical variable and the Mann-Whitney Test. The multivariate test employed is the logistic regression.

The binary logistic regression model can be expressed as follows:

\[ \text{DISC}_k = \beta_0 + \beta_1 \text{SIZE}_k + \beta_2 \text{IND}_k + \beta_3 \text{MI}_k + \beta_4 \text{LEV}_k + \beta_5 \text{DIVERS}_k \\
+ \beta_6 \text{OD}_k + \epsilon_k \]

where

- \( k \) denotes the firm
- \( \text{DISC} \) is 1 (0) if additional segment information is (is not) disclosed in 2000
- \( \text{SIZE} \) is the natural log of total assets
- \( \text{IND} \) is industry membership coded 1 if for mining and oil operations, otherwise 0
- \( \text{MI} \) is minority interest measured as the natural logarithm of one minus the percentage of the subsidiaries of each sample company that are wholly owned
- \( \text{LEV} \) is leverage measured as total liabilities divided by book value of total assets
- \( \text{DIVERS} \) is firm diversification measured by the number of industry segments or geographical segments
- \( \text{OD} \) is ownership diffusion measured by the percentage of ordinary shares not held by the top twenty shareholders
- \( \epsilon \) is the normally distributed random error

The results of the hypotheses tests are provided in Chapter 5.
The thesis is organised as follows: chapter 2 reviews the relevant literature on firm characteristics and voluntary disclosure of segment information. The study by Bradbury (1992) is presented first. This is followed by a review of the studies by McKinnon and Dalimunthe (1993), Kelly (1994) and Mitchell, Chia and Loh (1995). Finally, the study by Aitken, Hooper and Pickering (1997) is presented.

Chapter 3 reviews the theories that are used in formulating the hypotheses to be tested. Contracting theory is presented first. This is followed by a review of positive accounting theory and voluntary disclosure, and the motives for voluntary disclosure. The information problem and agency problem are then discussed. Finally, the six hypotheses to be tested in this thesis are presented.

Chapter 4 discusses the research methodology relating to the research design, the sample selection and the data collection procedures. Both univariate and multivariate tests were used to examine the hypotheses. The univariate tests performed were the independent t-test, a chi-square test for the categorical variable, and the Mann-Whitney U test. The multivariate test employed is the logistic regression. A detailed discussion of the measurement for the dependent and independent variables are then presented.

Chapter 5 discusses the results of the research. Descriptive statistics of the two groups of the independent variables and the univariate tests results are presented first. This is followed by the multivariate test results. The results of the hypotheses tests are then discussed.
Chapter 6 summarizes the major findings and the contributions of this thesis, acknowledges the limitations of the study and also explores the avenues for future research.
Chapter 2

Literature Review

2.1 Introduction

The literature review looks at five prior journal article publications on voluntary disclosure of segment information from 1992 to 1997, namely: Bradbury (1992), McKinnon and Dalimunthe (1993), Kelly (1994), Mitchell, Chia and Loh (1995), and Aitken, Hooper and Pickering (1997). These prior studies employed an economic incentives framework to study the relationship between firm characteristics and voluntary disclosure of segment information.

These five studies were selected because they were studies on voluntary disclosure of segment data. This research study is built on these previous studies and hence a review of these studies is very relevant. In reviewing the theory, hypotheses, research methodology and research findings, the literature review highlights the contributions and the strengths and limitations of the previous studies.

The literature review discusses the contribution in the research methodology by Bradbury (1992). This is followed by the contribution of McKinnon and Dalimunthe (1993), namely, the introduction of four hypotheses, and detailed measurements for the independent variables. The contribution by Kelly (1994) in introducing the return on investment (ROI) variable to test proprietary costs is then presented. This is followed by the contribution of Mitchell, Chia and Loh (1995) in re-testing a total of nine
hypotheses and in reconciling their research findings to that of Bradbury (1992) and McKinnon and Dalimunthe (1993). Finally, the contribution by Aitken, Hooper and Pickering (1997) in developing a diversification index (Divindex) as an alternative measurement for the diversification into related versus unrelated industries variable is presented.

2.2.1 Bradbury (1992)

Prior to 1990 New Zealand did not regulate the reporting of segment data. It therefore provides a suitable setting for Bradbury (1992) to examine the ability of five independent variables in predicting voluntary disclosure of segment information in a study of a sample of 29 New Zealand companies. The five independent variables are firm size, financial leverage, proportion of assets in place, earnings volatility and source of finance.

Agency theory was used to explain the firm size, financial leverage and proportion of assets in place hypotheses. The theory supporting the hypotheses was very briefly stated with very little detailed explanation as to how the theory relates to each particular hypothesis.

The earnings volatility and source of finance hypotheses were selected due to prior research findings. The earnings volatility hypothesis was selected because a negative association has been found between earnings volatility and the voluntary disclosure of earnings forecast. The source of finance hypothesis was selected because the financial market in which a firm operates has shown to have an impact on the level of voluntary financial disclosure.
The sample was chosen from fifty of the largest New Zealand firms by market capitalisation in 1983. Non-diversified firms were discarded yielding a final sample of 29 multi-product firms. The sample size of 29 firms to test five hypotheses may be considered small and a larger sample size would be preferable to increase the confidence level of the research findings.

Bradbury (1992) performed two separate univariate tests on the sample of firms. The usual univariate test of the voluntary disclosure group in comparison to the non-voluntary disclosure group was performed, plus the partial voluntary disclosure group in comparison to the full voluntary disclosure group. In performing the additional univariate test, the author was trying to establish if there are differences in firm characteristics between the partial and the full voluntary disclosure group. The finding between the two sub-groups of voluntary disclosure companies was not statistically significant.

Bradbury (1992) contributed by employing a dichotomous logistic model for the multivariate test. A dummy variable was also used to proxy for the existence of an overseas relationship besides FTL (foreign term loans to total debts). A separate regression was performed using the dummy variable to demonstrate that the presence of multicollinearity was not a serious problem. The author employed the dummy variable to test the presence of multicollinearity because his sample size was small and it would be appropriate to demonstrate that the presence of multicollinearity was not a serious problem.

Bradbury (1992) found a significant positive association between voluntary disclosure of financial segment data and the firm characteristic of size and financial leverage. No support was found for proportion of assets in place, earnings volatility, and source of finance.
2.2.2 McKinnon and Dalimunthe (1993)

McKinnon and Dalimunthe (1993) built on the work of Bradbury (1992) in an Australian context. These studies employed an economic incentives framework to examine firm specific characteristics. McKinnon and Dalimunthe examined a total of six firm characteristics, namely, the firm size and leverage variables for which Bradbury (1992) found significant and four additional variables.

McKinnon and Dalimunthe (1993) contributed in introducing four additional independent variables, namely, diversification into related versus unrelated industries, ownership diffusion, level of minority interest, and industry membership. The authors also contributed in the development of the six hypotheses.

McKinnon and Dalimunthe (1993) employed Chenhall’s (1979) classification of related and unrelated markets and technologies in classifying the sample of firms into two groups of companies, namely, firms that have diversified into related industries and firms that have diversified into unrelated industries. This is a very subjective task because the distinction between diversification into related and unrelated industries is based on the subjective criteria of “related/unrelated markets” and “related/unrelated technologies”. The authors did not disclose the source or area in the annual report, for example “Review of Operations”, they reviewed in arriving at the decision of whether a company has diversified into related or unrelated industries.

The impact of proprietary cost of competitive disadvantage on voluntary segment disclosure was not fully discussed in relation to companies with high return on investment, and widely varying performance across business segments. Kelly (1994) examined the proprietary costs of competitive
disadvantage on voluntary disclosure of segment data. He concluded that firms with high return on investment are less likely to voluntarily disclose disaggregated data than companies with low return on investment. Hayes and Lundholm (1996) argue that proprietary costs induce firms to provide disaggregated data only when they have similarly performing business segments. Firms with widely varying performance across business segments have incentives to conceal these performance differences from competitors by only reporting aggregate performance. Piotroski (1999a) examined firms’ decisions to provide additional segment disclosures. He concluded that firms with declining profitability and with less variability in profitability across industry segments are more likely to increase segment disclosures.

McKinnon and Dalimunthe (1993) employed the importance of the minority fraud issue and the potential of segment information to be relevant to an assessment of such fraud to explain voluntary segment disclosure where there is minority interest in the subsidiary companies of diversified firms. Evidence of the importance of the minority interest fraud issue were provided by the cases of Sanford v Sanford Courier Service Pty Ltd, Hurley v B.G.H. Nominees Pty Ltd, Prudential Assurance Co Ltd v Newman Industries Ltd, Re Overton Holdings Pty Ltd, Re Humes Ltd (McKinnon and Dalimunthe, 1993, p. 38).

Agency costs arguably increase with the increase in the level of minority interest in the subsidiary companies of diversified firms. Therefore management is more likely to voluntarily disclose segment information in diversified companies with higher levels of minority interest than such companies with lower levels of minority interest. This is in line with McKinnon and Dalimunthe’s (1993) argument that disclosure may serve to reduce the “potential costs” associated with the conflict of interest between group corporate management and minority interest shareholders.
McKinnon and Dalimunthe (1993) employed three proxies for the size variable, namely: total assets, number of shareholders and number of subsidiaries. Total assets was used to test competitive advantage and information production costs. The authors suggested that proprietary cost of competitive disadvantage is inversely related to size as smaller firms may feel that fuller disclosure of their activities will put them at a competitive disadvantage with larger companies in the industry. This contrasts the findings of Kelly (1994), Hayes and Lundholm (1996), and Piotroski (1999a). Arguably proprietary cost of competitive disadvantage is greater for companies with high profitability (Kelly, 1994) and widely varying performance across industry segments (Hayes and Lundholm, 1996) than companies with declining profitability and with less variability in profitability across industry segments (Piotroski 1999a).

McKinnon and Dalimunthe (1993) used number of shareholders and number of subsidiaries to test political visibility and demand for private information by financial analysts. As the number of shareholders and number of subsidiaries are proxies for the size variable, they should be used to test the size hypothesis. Moreover, the number of shareholders and the number of subsidiaries may not be a direct measure for the size of a company.

McKinnon and Dalimunthe (1993) contributed in the measurement of the independent variables. Detailed description of the measurement of the diversification into related versus unrelated industries, ownership diffusion, minority interest, size, industry membership, and leverage variables were given. However, the diversification into related versus unrelated industries variable was insignificant in both the univariate and the multivariate tests.

McKinnon and Dalimunthe (1993) performed the t-test as an additional univariate test besides the Mann-Whitney U test. The authors employed the binary probit analysis for the multivariate test. The results of the univariate
and multivariate tests are consistent. Significant support was found for ownership diffusion, the level of minority interest in subsidiaries, firm size and industry membership as factors influencing the voluntary disclosure of segment information. No support was found for leverage or diversification into related versus unrelated industries.

2.2.3 Kelly (1994)

Kelly (1994) built on the work of Bradbury (1992) and McKinnon and Dalimunthe (1993). Kelly employed the return on investment (ROI) variable to test the proprietary cost theory and the leverage variable to test the agency cost theory.

Kelly's (1994) major contribution is in the introduction of the return on investment (ROI) variable to test proprietary costs of competitive disadvantage. The expected sign of the return on investment variable is a negative sign of the coefficient as proprietary cost of competitive disadvantage is an economic disincentive for voluntary disclosure of segment data.

The sample was compiled from the largest 150 public corporations as listed in The Weekend Australian (30 June/1 July 1984). The final sample used to test the hypotheses comprised 132 multi-segment corporations: 34 disclosers and 98 non-disclosers. The return on investment hypothesis was used to test the proprietary costs of competitive disadvantage associated with disclosure and the financial leverage hypothesis was used to test the agency costs arising from non-disclosure.
Three control variables, namely, industry membership, firm size, and auditor identity were used in the multivariate probit analysis in addition to the explanatory variables of return on investment and financial leverage. Kelly (1994) created four industry dummy variables, namely, building contractors and suppliers, manufacturers and retailers, industrial and diversified resources, and others, to proxy for the industry membership control variable. Kelly contributed in the research methodology of creating four industry dummy variables to proxy for industry membership.

The estimated coefficient for the financial leverage variable was statistically insignificant in the probit analysis model indicating no support for the financial leverage hypothesis. This finding is in contrast to Bradbury (1992) but in line with McKinnon and Dalimunthe (1993).

The estimated coefficient of the return of investment variable is negative and is significant beyond the 5% level in the results of the probit analysis model. This means that firms with high return on investment are less likely to report disaggregated data than enterprises with low return on investment. Kelly (1994) contributed in this research finding as the empirical evidence highlights the importance of proprietary costs associated with competitor firms entering into a profitable segment of the corporation's market, and the effects of proprietary costs of competitive disadvantage on voluntary disclosure of segment data.
2.2.4 Mitchell, Chia and Loh (1995)

Mitchell, Chia and Loh (1995) extended earlier research by Bradbury (1992) and McKinnon and Dalimunthe (1993). The stated purpose of Mitchell et al.'s study is to investigate the robustness of McKinnon and Dalimunthe's empirical findings by employing a sample that has a relatively higher proportion of voluntary disclosers relative to non-disclosers.

Mitchell, Chia and Loh (1995) employed the STATEX database over the period 1983 – 1987 to search for their sample of diversified firms. The authors selected their sample according to Aitken et al.'s (1994) specification that most diversified firms are large as measured by market capitalisation and concentrated in the following Australian Stock Exchange defined industries: miscellaneous services, miscellaneous and diversified industrials, and diversified resources. The top 25 companies on the basis of market capitalisation, together with companies in the miscellaneous services, miscellaneous and diversified industrials, and diversified resources industries were selected. This yielded a sample of 129 potential multi-segment firms, listed as at 1983, with 43 voluntary disclosers and 86 non-voluntary disclosers.

Multi-segment firms are found in many of the Australian Stock Exchange 24 defined industries and not confined to miscellaneous services, miscellaneous and diversified industrials, and diversified resources. Arguably, a sample that comprises of companies across a broad number of industries is more representative of Australian diversified companies. This is illustrated by Kelly's (1994) sample, selected from the top 150 companies and yielding a final sample of 132 multi-segment corporations with 34 voluntary disclosers and 98 non-voluntary disclosers.

Mitchell, Chia and Loh (1995) employed a dichotomous classification for diversification into related versus unrelated industries. The authors presumed that the STATEX classification of diverse industrials and diverse resources, by the nature of the classification, refers to companies that have unrelated lines-of-business within the same entity.

Arguably, many diversified companies that are big in firm size as measured by market capitalisation and listed in the Australian Stock Exchange (ASX) top 200 shares have unrelated lines-of-business within the same entity. These companies may not be listed under diversified resources or diversified industrials but they are listed under their core business in the various ASX industry groups.

The research methodology employed by Mitchell et al. (1995) is similar to Bradbury (1992) in employing Spearman Correlations to test the presence of multicollinearity and in using Logistic Regression for the multivariate test.

Mitchell, Chia and Loh’s (1995) major contribution is in testing a total of nine hypotheses and in reconciling their research findings to that of Bradbury (1992) and McKinnon and Dalimunthe (1993). The authors found statistically significant support for the firm size, financial leverage and industry membership hypotheses in the multivariate logistic regression test.
2.2.5 Aitken, Hooper and Pickering (1997)

Aitken, Hooper and Pickering (1997) extended the study of McKinnon and Dalimunthe (1993). Aitken et al. (1997) was motivated by the diversification variable which McKinnon and Dalimunthe found to be insignificant.

McKinnon and Dalimunthe (1993) developed a diversification measure based on the technological or market relations between a firm's various segments. Aitken et al. (1997) argued that measures of diversification should be based on the relation of the earnings streams among industries, rather than on their technological or market relation.

If knowledge of the earnings stream of one industry is sufficient to provide an investor with knowledge of the earnings stream of another industry, then these industries are considered related. Aitken et al. (1997) argued that management may have less incentive to provide segment disclosure for related industries due to a lack of information value in the disclosure.

Segment information is likely to be more useful to investors where the correlation among the profit streams of the firm's various segments is low. Therefore, diversification should be measured by the degree of correlation among the earnings of all the firm's segments. High (low) correlations among segment earnings are indicative of diversification into related (unrelated) industries.

Aitken, Hooper and Pickering (1997) contributed by developing a diversification index (Divindex) to measure diversification into related versus unrelated industries, and this resulted in a continuous diversification variable ranging between zero and one.
The diversification index is a function of both the correlation between a firm's segments and the dispersion of its assets across its segments. High correlations between segments and/or high concentration of assets in a small proportion of segments will provide high values of Divindex (closer to one). Low correlations and relatively equal investment across segments will provide low values of Divindex (closer to zero).

Employing the same sample of 65 firms in the McKinnon and Dalimunthe (1993) study, Aitken et al. (1997) excluded 39 firms to arrive at a final sample of 26 firms with 11 disclosers and 15 non-disclosers. Binary probit analysis of segment disclosure choice was performed on this sample of 26 firms employing Divindex to proxy for diversification into related versus unrelated industries. Aitken et al. (1997) found diversification strategy, firm size, and the level of minority interest to be significantly related to segment disclosure.

2.3 Motivation for This Study

There are implications from the literature review that further research can be undertaken to examine the relationship between firm characteristics and voluntary disclosure of segment information in a regulated environment.

The McKinnon and Dalimunthe (1993) hypotheses can be re-examined under a regulated setting after the introduction of Australian Accounting Standard AAS 16 and Accounting Standard AASB 1005 Financial Reporting by Segments effective on or after 31st March 1985 and 30th June 1986
respectively but before the implementation of the revised Accounting Standard AASB 1005 Segment Reporting effective on or after 1st July 2001.

This thesis re-examines the six hypotheses in the McKinnon and Dalimunthe (1993) study under a regulated setting to ascertain whether diversified companies have motivation to provide additional segment data over and above the mandated three items of segment revenue, segment results, and segment assets required by Australian Accounting Standard AAS 16 and Accounting Standard AASB 1005 Financial Reporting by Segments. This thesis examines the firm characteristics of firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion.

A new measurement was used to measure the level of firm diversification which differed from the measure of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995). The firm diversification in this thesis is measured by the number of segments which is a continuous variable. McKinnon and Dalimunthe employed Chenhall’s (1979) classification of related and unrelated markets and technologies using a dichotomous variable in classifying diversification into related versus unrelated industries. Mitchell et al. employed the STATEX classification of diverse industrials and diverse resources using a dichotomous classification.

This firm diversification measure, that is, the number of segments, is possible in a regulated setting as companies are disclosing the number of industry segments and/or the number of geographical segments in the Notes to the Financial Statements under the item of Segment Reporting.

The measurement for voluntary disclosure in this thesis also differed from prior studies as this thesis is conducted under a regulated setting. A company that discloses more than the three mandated items of segment
revenue, segment results, and segment assets in its industry segments and/or geographical segments is classified as a "voluntary disclosure" company. A company that did not disclose more than the three mandated items is classified as a "non-voluntary disclosure" company.

There is also implication that the theory predicting and explaining the hypotheses can be further developed to emphasize the importance of information cost (also known as proprietary cost) of competitive disadvantage in relation to voluntary disclosure of segment information.

This thesis is motivated by the opportunity to study the effects of a different sample of firms, a larger sample size, a different measure for firm diversification, and a regulated setting on voluntary disclosure of financial segment data.

2.4 Summary

The literature review looks at five previous studies on voluntary disclosure of segment information. Bradbury (1992), McKinnon and Dalimunthe (1993), Kelly (1994), Mitchell, Chia and Loh (1995), and Aitken, Hooper and Pickering (1997) employed an economic incentives framework to study the relationship between firm specific characteristics and voluntary disclosure of segment information.

Bradbury (1992) tested five firm characteristics, namely: firm size, financial leverage, proportion of assets in place, earnings volatility and source of finance. Bradbury found a significant positive association between
voluntary disclosure of financial segment data and the firm characteristic of size and financial leverage.

McKinnon and Dalimunthe (1993) built on the work of Bradbury (1992). They examined a total of six firm characteristics, namely: the firm size and financial leverage variables for which Bradbury found significant and the industry membership, minority interest, firm diversification and ownership diffusion variables. McKinnon and Dalimunthe found significant support for ownership diffusion, the level of minority interest in subsidiaries, firm size and industry membership as factors influencing the voluntary disclosure of segment information. No support was found for leverage or diversification into related versus unrelated industries.

Kelly (1994) introduced the return on investment (ROI) variable to test proprietary costs and the financial leverage variable to test agency costs associated with unregulated segment reporting. Kelly found a significant positive correlation between return on investment and voluntary segment disclosure. No support was found for financial leverage.

Mitchell, Chia and Loh (1995) built on the work of Bradbury (1992) and McKinnon and Dalimunthe (1993). Mitchell et al. found voluntary segment disclosure is significantly related to size, leverage and mining and oil industry.

Aitken, Hooper and Pickering (1997) extended the study of McKinnon and Dalimunthe (1993). The authors developed a diversification index (Divindex) to measure diversification into related versus unrelated industries. Aitken et al. found diversification strategy, firm size, and the level of minority interest to be significantly related to segment disclosure.
There are implications from the literature review that further research can be undertaken to examine the relationship between firm characteristics and voluntary disclosure of segment information as the findings in the prior studies are not unanimous.

This thesis builds on the work of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995). This research study is motivated by the opportunity to study the effects of a different sample of firms, a larger sample size, a different measure of diversification, and a regulated setting on voluntary disclosure of financial segment data.
Chapter 3

Theory Development and Hypotheses Formulation

3.1 Introduction

Previous studies on voluntary disclosure of segment information have found a significant correlation between voluntary disclosure and firm size and industry membership (McKinnon and Dalimunthe, 1993; Mitchell, Chia and Loh, 1995; Aitken, Hooper and Pickering, 1997) but differing results between voluntary disclosure and minority interest, ownership diffusion, financial leverage and firm diversification.

This thesis will re-investigate the relationship between voluntary disclosure and six firm characteristics, namely, firm size, industry membership, minority interest, financial leverage, firm diversification and ownership diffusion in a regulated setting. The selection of the six firm characteristics was done on the basis of testing the agency theory and contracting theory as well as to facilitate comparison of the results with prior research studies.

The theory development which closely follows Jensen and Meckling (1976), Watts and Zimmerman (1990) and Healy and Palepu (2001) is presented first. This is followed by a discussion on agency costs, information costs, political costs and voluntary disclosure of segment information. The six hypotheses are then presented.
3.2.1 Agency Theory

Jensen and Meckling (1976) defined an agency relationship as 'a contract under which one or more persons [principal(s)] engage another person [the agent] to perform some service on their behalf which involves delegating some decision making authority to the agent'. This causes problems (costs) because the agents may not always act in the best interests of the principal. Management may make decisions that maximise their own wealth. Losses resulting from such decisions and expenditures incurred to mitigate them are referred to as agency costs.

Agency costs comprise of monitoring expenditure by the principals (e.g. cost of employing auditors), bonding expenditure by the agent (e.g. cost of preparing financial reports) and a residual loss (Jensen and Meckling, 1976). Management acts as agent for the shareholders and bondholders in the context of making decision choices and managing the firm. Two potential conflicts of interest exist: the shareholders and management conflict, giving rise to agency cost of equity; and the bondholders and shareholders/management conflict, giving rise to agency cost of debt.

Jensen and Meckling (1976) studied contracts between bondholders and shareholders/management and between shareholders and management. These contracts arise to minimise the costs associated with the conflicts of interest between the parties. Since accounting measurements are used to enforce many of the contracts, agency theory is used to explain the choice in methods of accounting measurements and segment disclosure choice. Voluntary disclosure of additional segment information over and above that required by AASB 1005 is an accounting choice decision by management.
Voluntary additional segment information disclosure can reduce the agency cost of equity as segment information is considered useful additional information to shareholders about the outcomes of decisions made by management. Voluntary additional segment information disclosure can also reduce the agency cost of debt by facilitating debt suppliers with information to make better predictions about the growth, ability to extinguish debt, and risk and return prospects of a diversified group of companies.

3.2.2 Contracting Theory

Watts and Zimmerman (1978, 1990) suggest that contracting costs is an important factor in offering an explanation of accounting practice. Contracting costs incorporated a wide variety of costs and included the agency costs specified in agency theory from Jensen and Meckling (1976).

Watts and Zimmerman (1990) identified that contracting costs consist of transaction costs (e.g., brokerage fees), agency costs (e.g., monitoring costs, bonding costs, and the residual loss from dysfunctional decisions), information costs (e.g., the costs of becoming informed), renegotiation costs (e.g., the costs of rewriting existing contracts because the extant contract is made obsolete by some unforeseen event), and bankruptcy costs (e.g., the legal costs of bankruptcy and the costs of dysfunctional decisions).

Contracting costs arise in (i) market transactions (e.g., selling new debt or equity requires legal fees and underwriting costs), (ii) transactions internal to the firm (e.g., a cost-based transfer price scheme is costly to maintain and can produce dysfunctional decisions), and (iii) transactions in the political process.
(e.g., securing government contracts or avoiding government regulation requires lobbying costs).

Accounting researchers have recently returned to using the notion of an efficient set of accounting methods to explain accounting choice (Zimmer 1986). In competition among firms, those that organise themselves to minimise contracting costs are more likely to survive (Fama and Jensen 1983). This suggests that accounting methods affect the firm’s organisational costs and so the accounting choice methods that survive are those that minimise contracting costs. This also suggests that agency and other costs would also affect accounting choice.

Jensen and Meckling (1976) suggest that within the firm the lack of a market price is replaced by systems for allocating decisions among managers, and measuring, rewarding and punishing managerial performance. Accounting plays a role in these systems and so is a part of the firm’s efficient contracting technology.

Contracts that use accounting numbers are not effective in aligning managers’ and contracting parties’ interest if managers have complete discretion over the reported accounting numbers. Hence, we expect some restrictions on managers’ discretion over accounting numbers, but some discretion will remain. When managers exercise this discretion it can increase the wealth of all contracting parties, or increase the wealth of the managers at the expense of some other contracting party or parties. If managers elect to exercise discretion to their advantage and the discretion has wealth redistributive effects among the contracting parties, then we say the managers acted “opportunistically”.

Ex ante, the set of accounting choices restricted by the contracting parties is determined by “efficiency” factors to maximise firm value. Ex post, wealth
is redistributed by managerial opportunism, but ex ante some redistribution was expected and the parties price protect their interests. Price protection does not eliminate the incentive to act opportunistically nor does price protection eliminate the costs of managers taking opportunistic actions. The extent to which contracts can be written ex ante to prevent such ex post opportunistic behaviour increases the chance that the firm will survive in a competitive environment (Klein, 1983).

The set of accounting procedures within which managers have discretion is called the “accepted set”, and is determined by the contracting parties. Contracting parties include management, shareholders, bondholders, suppliers, customers and employees. Managerial discretion over accounting method choice (i.e. the “accepted set”) is predicted to vary across firms with the variation in the costs and benefits of restrictions. These restrictions produce the “best” or “accepted” accounting principles even without mandated accounting standards by government and are enforced by external auditors (Watts and Zimmerman 1990, p. 136).

Accounting choice affects the contracting parties’ wealth and depends on the relative magnitudes of the contracting costs (Watts and Zimmerman, 1990). To understand the concern of management with the accounting policies used in external financial reporting requires identifying how accounting methods affect management’s wealth. Incentive remuneration is affected by the firm’s financial reports, both directly and via the stock market. The reported earnings in the financial reports could change the level of bonus payments, direct cash flow effects (e.g. tax effects) and expected cash flow impacts (e.g. debt covenants, political costs).

Voluntary disclosure decision is an accounting policy choice of the management of the firm. Agency costs, political costs and information costs are contracting costs and the management of the firm will select the accounting
policy choice of voluntary disclosure to minimise contracting costs provided there is a net benefit in the voluntary disclosure decision.

Contracting costs arise in transactions in the political process (Watts and Zimmerman 1990). Watts and Zimmerman (1978, 1986) contend that a firm's political visibility may be an important determinant of management's choice of accounting policy. Politically visible firms make accounting choices that they perceive will reduce the political costs imposed by the government, its regulatory agencies and private interest groups.

Information costs are contracting costs (Watts and Zimmerman 1990). Kelly (1994) investigated the relationship between information costs, also known as proprietary costs, and voluntary disclosure of segment data. Proprietary costs of disclosure constitute: (i) the expenditure incurred in generating and disseminating accounting information and (ii) the cost associated with publishing financial information which is commercially valuable and potentially damaging to a corporation's prospects. The relative magnitude of proprietary costs or information costs depends on: (i) the release of unfavourable information that conveys negative expectations about a firm's future cash flows and (ii) the probability that shareholders, debtholders, potential entrants will benefit from favourable accounting disclosures (Verrecchia, 1983, 1990b; Wagenhofer, 1990).

Edwards and Smith (1996) investigated the cost of providing information in contrast to the associated benefits. In relation to segmental reporting, the information costs have been described as including the full range of collection, processing and dissemination costs, and also the cost of competitive disadvantage.

Several researchers hypothesize that firms' decisions to disclose information to investors is influenced by concern that such disclosures can
damage their competitive position in product markets (Verrecchia, 1983; Darrough and Stoughton, 1990; Wagenhofer, 1990; Feltham and Xie, 1992; Newman and Sansing, 1993; Darrough, 1993; Gigler, 1994). These studies conclude that firms have an incentive not to disclose information that will reduce their competitive position, even if it makes it more costly to raise additional equity. However, this incentive appears to be sensitive to the nature of the competition, in particular whether firms face existing competitors or merely the threat of entry, and on whether firms compete primarily on the basis of price or long-run capacity decisions.

Hayes and Lundholm (1996) argue that proprietary costs induce firms to provide disaggregated data only when they have similarly performing business segments. Firms with widely varying performance across business segments have incentives to conceal these performance differences from competitors by only reporting aggregate performance.

Piotroski (1999a) examines firms' decisions to provide additional segment disclosures. He concludes that firms with declining profitability and with less variability in profitability across industry segments are more likely to increase segment disclosures, consistent with the proprietary cost hypothesis.

3.3 Agency Costs, Information Costs, Political Costs and Voluntary Disclosure

Research using the contracting perspective finds that accounting decisions are influenced by compensation and debt contracts, as well as political cost considerations (Healy and Palepu, 2001). Contracts between management and shareholders are known as compensation contracts and
contracts between the firm and its creditors are known as debt contracts. Political cost considerations include managements' concern about attracting explicit and implicit taxes or regulatory actions. This thesis examines the effects of agency costs, information costs and political costs on voluntary disclosure of segment information in a regulated setting.

The agency cost of equity arises because shareholders delegated the responsibility of management to the managers. Consequently the managers have an incentive to make decisions that expropriate shareholders' funds by acquiring perquisites, pay excessive compensation, or make investment or operating decisions that are harmful to the interests of the shareholders (Jensen and Meckling, 1976).

Compensation contracts can be used to solve this agency problem. Managers are directly rewarded using a variety of stock-based compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to engage in voluntary disclosures under these types of compensation plans. Managers interested in trading their stock holdings have incentives to disclose private information to meet restrictions imposed by insider trading rules. Restrictions on insider trading provide managers with incentives to make voluntary disclosures to correct any perceived undervaluation prior to the expiration of stock option awards (Healy and Palepu, 2001).

Managers acting in the interests of existing shareholders have incentives to provide voluntary disclosures to reduce contracting costs associated with stock compensation for new employees. Stock compensation is more likely to be an efficient form of remuneration for managers and owners if stock prices are a precise estimate of firm values. Otherwise, managers will demand additional compensation to reward them for bearing any risk associated with under-valuation. Firms that use stock compensation
extensively are therefore likely to provide additional disclosure to reduce the risk of undervaluation (Healy and Palepu, 2001). Aboody and Kasznik (2000) show that firms delay disclosure of good news and accelerate the release of bad news prior to stock option awards periods, consistent with managers making disclosure decisions to increase stock-based compensation.

The agency cost of debt arises because managers have an incentive to make decisions that expropriate debtholders’ funds by issuing additional more senior claims, by paying out dividends or by taking on high risk capital projects (Smith and Warner, 1979). The issuance of new senior debt and payment of dividends reduces the likelihood of sufficient resources available to fully repay existing of lower priority debt in the event of financial distress. Risky investment projects increase the likelihood of both good outcomes that disproportionately benefit the shareholders, and bad outcomes that are disproportionately borne by debtholders.

Debt contracts seek to align the interests of management with those of debtholders. These contracts frequently require management to disclose relevant information that enable debtholders to monitor compliance with contractual agreements and to evaluate whether management have managed the firm’s resources in their interests. Management have incentives to voluntarily disclose segment information to reduce the agency cost of debt.

Voluntary disclosure studies assume that managers have superior information to shareholders, debtholders and investors on the firms’ expected future performance even in an efficient capital market. Where there is information asymmetry between management and shareholders, debtholders and investors, financial analysts collect information from public and private sources, evaluate the current performance, make earnings forecasts and recommendations to investors. Verrecchia (1983) notes that where there is a demand for private information by investors, its non-disclosure is likely to be
interpreted as bad news and hence adversely affect firm value. Thus management have incentive to voluntarily disclose segment information to facilitate better assessment of the firm's performance.

Information costs includes the full range of collection, processing and dissemination costs and also the cost of competitive disadvantage (Kelly, 1994; Edwards and Smith, 1996). There are two major forces in the information costs influencing voluntary disclosure: (i) the cost of providing information and (ii) the corresponding associated benefits. Firms will voluntarily disclose segment information provided the increase in firm value from disclosure will offset the decrease in firm value from proprietary costs. This argument is reinforced where there is an increase in firm value as management may be rewarded with an increase in bonus payments and an increase in the value of their share options.

There is a theoretical relationship between industry membership and political costs, whereby a certain industry is subjected to greater political scrutiny than others, for example, the resources industry (Ball and Foster, 1982; Craswell and Taylor, 1992). The resources industry is politically sensitive and this may be attributable to its strategic importance as a major employer, a major export earner and an important supplier of energy and raw materials to other industries.

Certain industries may attract scrutiny from government agencies and special interest groups because of their strategic importance. The oil and gas industry in the USA has often been suggested as an example of such an industry (Whittred and Zimmer, 1990). Similarly the political sensitivity of the oil and mining industry has also been noted in Australia (Sidhu and Whittred, 1992). These companies are more likely to voluntarily disclose additional segment information in order to reduce the political costs imposed by the government, its regulatory agencies and private interest groups.
Voluntary disclosure of segment information is dependent on many factors including agency costs, political costs and information costs (proprietary costs) and it is the overall effect of these contracting costs acting together at the same time which would result either in voluntary or non-voluntary disclosure of segment information.

3.4 Hypotheses Formulation

The six hypotheses in this thesis focus on a test of the contracting theory and agency theory. Specifically, the firm size variable and the firm diversification variable are used as a test of the contracting theory (information costs), the industry membership variable is employed to test the contracting theory (political costs), and the minority interest, financial leverage, and ownership diffusion variables are used as a test of the agency theory (agency costs).

Prior Australian voluntary disclosure of segment information studies also employed the agency theory and contracting theory to test the hypotheses. McKinnon and Dalimunthe (1993), Mitchell, Chia and Loh (1995) and Aitken, Hooper and Pickering (1997) employed contracting theory to test the diversification into related versus unrelated industries hypothesis, the firm size hypothesis, and the industry membership hypothesis; and agency theory to test the ownership diffusion, minority interest and leverage hypotheses. Kelly (1994) employed the contracting theory (proprietary costs) to test the return on investment hypothesis and the agency theory to test the leverage hypothesis.
The following six hypotheses are formulated for testing to facilitate comparison of the results of this thesis with prior research studies.

3.5.1 Firm Size Hypothesis

Watts and Zimmerman (1990, p. 134) state that contracting costs consist of transaction costs, agency costs, information costs (e.g. the costs of becoming informed), renegotiation costs and bankruptcy costs.

Edwards and Smith (1996) and Kelly (1994) investigated the cost of providing information in contrast to the associated benefits. In relation to segment reporting, the information costs have been described as including the full range of collection, processing and dissemination costs, and the cost of competitive disadvantage.

Kelly (1994) found that firms with high return on investment are less likely to report disaggregated data than those with low return on investment due to information costs of competitive disadvantage with competitor firms entering into a profitable segment of the corporation's market.

Larger companies are more likely to have a larger financial analysts’ and investors’ following. Where there is information asymmetry between management and investors, financial analysts collect information from public and private sources, evaluate the current performance of firms that they follow, make earnings forecasts and recommendations to investors. Verrecchia (1983) notes that where there is a demand for private information by investors, non-disclosure of the information is likely to be interpreted as bad news and hence adversely affect firm value. Hence, management will weigh the costs of disclosure versus the costs of non-disclosure, and voluntary disclosure is more
likely where there is a net benefit from disclosure to the firm. Hypothesis 1 is stated as follows:

H1: Larger Australian companies are more likely to voluntarily disclose additional segment information than smaller companies.

3.5.2 Industry Membership Hypothesis

Industry membership has been identified to affect accounting policy choice method and voluntary disclosure. Certain industries may attract scrutiny from government agencies and special interest groups because of their strategic importance. The oil and gas industry in the USA has often been suggested as an example of such an industry (Whittred and Zimmer, 1990, p. 35). In Australia, the mining and oil industry is politically sensitive and this may be attributable to its strategic importance.

There will be a trade-off by management in weighing up the proprietary costs and political costs of voluntary disclosure. Greater disclosure of proprietary information will increase proprietary costs (especially the costs of competitive disadvantage), but will reduce political costs (especially the deflection of unwanted scrutiny by external regulators).

Companies with operations in the mining and oil industry are more likely to voluntarily disclose additional segment information in order to reduce the political costs imposed by the government, its regulatory agencies and private interest groups. Craswell and Taylor (1992, p. 300) suggest that firms that are susceptible to political costs will disclose additional information as a means of enhancing their corporate image. Hypothesis 2 is stated as follows:
H2: Australian companies in the mining and oil industries are more likely to voluntarily disclose additional segment information than companies that are not in the mining and oil industries.

3.5.3 Minority Interest Hypothesis

Minority interest is the shares in subsidiaries of the parent company that are held by outside or minority shareholders. Consolidated financial statements provide information to the shareholders of diversified firms on the performance and financial position of the company and its controlled entities.

The separation of ownership and control by the outside shareholders delegating the responsibility to the managers for managing the business give rise to an agency problem. The managers can use the corporate funds to acquire perquisites, pay excessive compensation or make investment or operating decisions that are harmful to the interests of minority interest shareholders (Jensen and Meckling, 1976).

Jensen and Meckling (1976) and Leftwich, Watts and Zimmerman (1981) note the increase in agency costs associated with the increasing separation of the management from the owners of the firm. The potential benefits of voluntary disclosure increase with shareholders and management conflicts and therefore increase with minority interest shareholders in the subsidiaries of the parent company.

Additional segment information over and above that required by AASB 1005 *Financial Reporting by Segments* provides useful information for minority shareholders. This voluntary disclosure may serve to reduce the potential agency costs associated with the conflict of interest between
management and the minority interest shareholders. Hypothesis 3 is stated as follows:

H3: Australian companies with higher levels of minority interest in their subsidiary companies are more likely to voluntarily disclose additional segment information than companies with lower levels of minority interest.

3.5.4 Financial Leverage Hypothesis

The agency problem arises because investors (debtholders) delegated the responsibility of management of the firm to the managers. Consequently, once investors have invested their funds in a business, the managers have an incentive to make decisions that expropriate debtholders' funds.

Management can expropriate the value of the debtholders' investment by issuing additional more senior claims, by paying out the cash received from investors as a dividend, or by taking on high risk capital projects (Smith and Warner, 1979). The issuance of new senior debt and payment of dividends reduces the likelihood of sufficient resources available to fully repay existing or lower priority debt in the event of financial distress. Also the poor earnings outcomes of risky investment projects are disproportionately borne by the debtholders.

Jensen and Meckling (1976) and Smith and Warner (1979) suggested that agency costs are higher for firms with high levels of debt in their capital structure, and that voluntary disclosure can reduce these costs by facilitating debt suppliers' assessment of a firm's ability to meet its debt.
Voluntary disclosure of additional segment information may allow debt suppliers to make better predictions about the growth, future earnings, cash flow, and the risk and return prospects of a company, or group of companies. Hence it is hypothesized that:

H4: Australian companies with higher levels of leverage are more likely to voluntarily disclose additional segment information than such companies with lower levels of leverage.

3.5.5 Firm Diversification Hypothesis

According to Aitken, Czernkowski and Hooper (1994), most diversified firms are large as measured by market capitalisation and concentrated in the following Australian Stock Exchange defined industries: miscellaneous services, miscellaneous and diversified industrials and diversified resources.

McKinnon and Dalimunthe (1993, p. 36) drawing on the work of Grossman (1981) and Milgrom (1981) suggest that where management has private information that is useful to investors in assessing firm value, the benchmark outcome of analytical models of voluntary disclosure is that if the information can be credibly revealed without cost, then disclosure will occur.

Highly diversified firms are more likely to have a larger financial analysts' following. Where there is information asymmetry between management and investors, financial analysts collect information from public and private sources, evaluate the current performance of firms that they follow, make earnings forecasts and recommendations to investors. Highly diversified firms are likely to have more information content for investors and so there will be a greater demand for segment disclosure by these firms. Verrecchia
(1983) notes that where there is a demand for private information by investors, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value. Hence highly diversified companies are more likely to voluntarily disclose additional segment information.

Managers are directly rewarded using a variety of stock-based compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to engage in voluntary disclosures under these types of compensation plans to reduce the risk of undervaluation (Healy and Palepu, 2001).

Verrecchia (1983), Craswell and Taylor (1992), Kelly (1994), and Edwards and Smith (1996) noted the importance of proprietary costs of disclosure. Proprietary costs refer to the costs imposed on the firm if information disclosed can be used by external parties such as competitors in a way that is harmful to the firm. Therefore highly diversified firms will disclose private information for which there is a demand, provided that the increase in firm value from disclosure will offset the decrease in firm value from proprietary costs. This argument is reinforced by an increase in firm value because management have incentives to voluntarily disclose additional segment information as an increase in firm value may increase their bonus payments and the value of their share options. Hypothesis 5 is stated as follows:

H5: Australian companies with higher levels of diversification are more likely to voluntarily disclose additional segment information than companies with lower levels of diversification.
3.5.6 Ownership Diffusion Hypothesis

Jensen and Meckling (1976) and Leftwich, Watts and Zimmerman (1981) noted the increase in agency costs associated with the increasing level of non-owner management in the firm. These agency costs arise from the separation of the principals (shareholders) from the decision-making function in the firm. Where a firm’s shares are widely held, there is a greater separation between the firm’s decision-making function and its principals than where the firm’s shares are held by a relatively small number of shareholders (Schipper, 1981; Craswell and Taylor, 1992). Hence it is expected that the agency costs of equity will be higher where a firm’s shares are widely held.

One way of reducing these agency costs may be through the voluntary provision of additional information to the principals about the outcomes of the decisions made by the agent on the principals’ behalf (Watts, 1977; Whittred, 1987; Craswell and Taylor, 1992; Healy and Palepu, 2001). Disclosure of additional segment data may be considered useful information to shareholders about the outcomes of decisions made by management. Additional segment information over and above that required by AASB 1005 Financial Reporting by Segments allow shareholders to better assess the risk, return and growth prospects of the firm by industry segments and geographical segments. Such disclosure may reduce agency costs. Hence there are incentives for the management of companies with widely held shareholdings to voluntarily disclose additional segment information. Hypothesis 6 is stated as follows:

H6: Australian companies with widely held shareholdings are more likely to voluntarily disclose additional segment information than such companies with closely held shareholdings.
3.6 Summary

The theoretical frameworks employed in this research study are agency theory and contracting theory. Compensation contracts are employed to resolve the potential conflicts of interest between the shareholders and managers giving rise to agency cost of equity. Debt contracts are employed to resolve the bondholders and shareholders/managers conflict giving rise to agency cost of debt. Management may voluntarily disclose additional segment information to reduce these agency costs.

Compensation contracts and debt contracts align the interests of management with those of shareholders and debtholders. Managers are directly rewarded using a variety of compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to maximise firm value under these compensation plans as they may be rewarded with an increase in bonus payments and an increase in the value of their share options.

There are two forces influencing voluntary disclosure in information costs: (i) the cost of providing information and (ii) the corresponding associated benefits. Where there is a demand for private information by shareholders, debtholders and investors, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value. Managers have incentives to voluntarily disclose additional segment information if there is a net benefit in disclosure.

Certain industries may attract a disproportionate share of scrutiny from government agencies and special interest groups. These companies are more likely to voluntarily disclose additional segment information to reduce the likelihood of political costs. Political considerations include managers' concern about attracting explicit and implicit taxes, or regulatory actions.
Six hypotheses are formulated for testing to facilitate comparison of the results of this thesis with McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995). The six hypotheses focus on a test of the contracting theory and agency theory. The firm size and firm diversification hypotheses are used as a test of the contracting theory, information costs. The industry membership hypothesis is employed to test the contracting theory, political costs. The minority interest, financial leverage and ownership diffusion hypotheses are used as a test of the agency theory.
4.1 Introduction

The research methodology comprises the research design, the sample selection, the data collection, and the measurement of the dependent and independent variables. This chapter will first discuss the research design. Next, the sample selection is presented. This is followed by the data collection. Lastly, the measurement of the dependent and independent variables are presented and discussed.

4.2 The Research Design

The purpose of the research design section is to describe how the six hypotheses will be tested. First, descriptive statistics of the continuous independent variables displaying the mean, median, minimum, maximum, and standard deviation of the "voluntary disclosure" group and the "non-voluntary disclosure" group are designed to examine the statistics of the two groups of companies.

Second, the univariate tests are designed to examine the six hypotheses. The Levene's test for equality of variances will be performed on all the continuous variables to test whether they conform to a normal distribution.
Natural logarithm transformation will be performed on the variables that are skewed (do not conform to a normal distribution). The parametric t-test will be performed to provide robust results in the univariate test and a Chi-square test will be performed for the categorical variable. The non-parametric Mann-Whitney U test will also be run and displayed for comparison purposes.

Third, Pearson correlation is designed to test the presence of multicollinearity between the continuous variables. A Pearson correlation matrix for the continuous variables will be presented displaying the correlations among the independent variables.

Lastly, the research design employs the multivariate logistic regression to test the six hypotheses for voluntary disclosure of additional segment information. The multivariate logistic regression is a more robust test than the univariate t-test. This is because, in the univariate test, the variable is tested in isolation from the other variables. Logistic regression examines the combined ability of all variables to explain the decision to voluntarily disclose. It provides an indication of the statistical significance of individual independent variables, as well as for the overall model$^3$.

The logistic model can be expressed as follows:

$$
DISC_k = \beta_0 + \beta_1 SIZE_k + \beta_2 IND_k + \beta_3 MI_k + \beta_4 LEV_k + \beta_5 DIVERS_k + \beta_6 OD_k + \epsilon_k
$$

where

- $k$ denotes the firm
- $DISC$ is 1 (0) if additional segment information is (is not) disclosed in 2000
- $SIZE$ is the natural logarithm of total assets
IND is industry membership coded 1 if for mining and oil operations, otherwise 0

MI is minority interest measured as the natural logarithm of one minus the percentage of the subsidiaries of each sample company that are wholly owned

LEV is leverage measured as total liabilities divided by book value of total assets

DIVERS is firm diversification measured by the number of industry segments or geographical segments

OD is ownership diffusion measured by the percentage of ordinary shares not held by the top twenty shareholders

ε is the normally distributed random error

4.3 The Sample Selection

The research methodology employs the sample selection to select the target companies' annual reports from which the data for the hypotheses testing is obtained.

Sample selection begins with a list of companies from 2001 Personal Investor Top 300 Shares. Top 300 Shares ranks public listed companies based on market capitalisation and is the top 300 companies traded in the Australian Stock Exchange. The companies for the sample were selected from these top 300 companies traded in the Australian Stock Exchange (ASX) from January to December 2001. A sample of companies drawn from the ASX top 300 companies allows for an examination of voluntary disclosure of segment information in both the industry segments and geographical segments. This is because the Australian Stock Exchange top 300 companies are likely to have geographical segments besides industry segments.
The year 2000 annual reports (that is, companies’ annual reports for the year ended 1 January 2000 to 31 December 2000) were requested from companies listed in 2001 Personal Investor Top 300 Shares. The first 200 annual reports received are taken as the initial sample of companies for data collection6.

Fifteen companies were excluded from the initial sample of 200 companies to arrive at a final sample size of 185 companies as shown in Table 1. Banks were not included in the final sample of companies as they tend to have atypical asset structures and high financial leverage. Foreign incorporated companies were also excluded as financial data were reported in a foreign currency and not in Australian dollars. A list of the final sample of 185 companies is provided in Table 27.

Table 1
Largest Australian Publicly Traded Companies*
(Listed in Personal Investor Top 300 Shares during 2001)

Sample Selection Procedure

<table>
<thead>
<tr>
<th>Sample Selection Procedure</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Initial sample of companies</td>
<td>200</td>
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<tr>
<td>Banks</td>
<td>( 7 )</td>
</tr>
<tr>
<td>Foreign companies (companies not incorporated in Australia)</td>
<td>( 8 )</td>
</tr>
<tr>
<td>Final sample of companies</td>
<td>185</td>
</tr>
</tbody>
</table>

*Note. *Largest firms based on market capitalisation.
Table 2

<table>
<thead>
<tr>
<th>Final Sample of 185 Companies</th>
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<tr>
<td>Adelaide Brighton</td>
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<td>Amalgamated Holdings</td>
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<td>AmcIl</td>
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<td>Amcor</td>
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<td>AMP Diversified Property Trust</td>
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<td>AMP Shopping Centre Trust</td>
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<td>Amrad Corporation</td>
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<tr>
<td>Anaconda Nickel</td>
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<tr>
<td>APN News and Media</td>
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<tr>
<td>Aristocrat Leisure</td>
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<tr>
<td>Ausdoc Group</td>
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<tr>
<td>Austar United Communications</td>
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<tr>
<td>Australian Foundation Investment</td>
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<td>Australian Growth Properties</td>
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<td>Australian Gas Light Company</td>
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<td>Australian Infrastructure Fund</td>
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<td>Australian Worldwide Exploration</td>
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<td>Bendigo Mining NL</td>
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<td>BHP</td>
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<td>Biota Holdings</td>
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<td>Boral</td>
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<td>Brambles Industries</td>
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<td>BRL Hardy</td>
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<tr>
<td>BT Australian Equity Management</td>
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<td>BT Office Trust</td>
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<tr>
<td>Bunnings Warehouse Property</td>
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<td>Burns, Philp &amp; Company Ltd</td>
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<td>Burswood</td>
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<td>Cable and Wireless Optus</td>
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<td>Caltex Australia</td>
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<td>Campbell Brothers</td>
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<td>Capral Aluminium</td>
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<td>Cellnet Telecommunications</td>
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<td>Central Equity</td>
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<tr>
<td>Central Pacific Minerals NL</td>
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<tr>
<td>Challenger International</td>
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<td>Circadian Technologies</td>
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<td>Clough</td>
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<td>Coal &amp; Allied</td>
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<td>Coates Hire</td>
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<td>Coca-Cola Amatil</td>
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<td>Final Sample of 185 Companies</td>
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<tr>
<td>Intellect Holdings</td>
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<td>Investor Group</td>
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<td>James Hardie Industries</td>
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<td>John Fairfax Holdings</td>
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<td>Lang Corporation</td>
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<td>Leighton Holdings</td>
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<td>Lion Nathan</td>
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<td>Macquarie Corporate Telecom</td>
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<td>Metcash Trading</td>
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<td>Miller's Retail</td>
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<td>Milton Corporation</td>
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<td>M.I.M. Holdings</td>
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<td>Murchison United NL</td>
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<td>MYOB</td>
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<td>National Foods</td>
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<td>Newcrest Mining</td>
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<td>News Corporation</td>
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<td>Normandy Mining</td>
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<td>Novus Petroleum</td>
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<td>NuFarm</td>
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<td>Oil Company Of Australia</td>
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<td>Open Telecommunications</td>
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<td>OPRM</td>
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<tr>
<td>Orbital Engine Corporation</td>
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<td>Orica</td>
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<td>Origin Energy</td>
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<td>Pacific Dunlop</td>
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<td>Pacific Hydro</td>
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<td>Pacifica Group</td>
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<td>Pacmin Mining Corporation</td>
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<td>Paperlinx</td>
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<td>Pasminco</td>
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<td>Peptech</td>
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<td>Platinum Capital</td>
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<td>PMP Communications</td>
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<td>Portman</td>
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<td>Pracom</td>
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<td>Primary Health Care</td>
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<td>Prime Television</td>
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<tr>
<td>Programmed Maintenance</td>
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<tr>
<td>Publishing and Broadcasting</td>
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<tr>
<td>QBE Insurance Group</td>
</tr>
<tr>
<td>Queensland Cotton Holdings</td>
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<tr>
<td>Ramsay Healthcare</td>
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</table>
4.4 Data Collection

A data sheet was designed for collecting and recording the required data to test the hypotheses. The data required for testing the firm size, minority interest, financial leverage, firm diversification, and ownership diffusion hypotheses were extracted from the 185 final sample companies’ annual reports. The data required to test the industry membership hypothesis is a dichotomous classification and is obtained from the Australian Stock Exchange 24 defined industry groups.

The data for the dependent variable, disclosure, is a dichotomous classification and is obtained from the 185 final sample companies’ annual reports. Companies that disclosed additional segment data over and above the 3 items required under the old Accounting Standard AASB 1005, namely: segment revenue, segment results and segment assets are classified as “voluntary disclosure” firms. Companies that disclosed the 3 items of segment data required by the old Accounting Standard AASB 1005 or that they are operating in one industry and one geographical segment are classified as “non-voluntary disclosure” firms.

Kelly (1994) in his study on the impact of proprietary costs on Australian unregulated segment reporting, compiled his sample from the largest 150 public corporations as listed in The Weekend Australian (30 June/1 July 1984). His final sample of 132 corporations consisted of 34 disclosers and 98 non-disclosers. In line with Kelly’s final sample, the final sample of companies in this research study included those companies operation in one industry and one geographic segment.

As one of the disincentives for voluntary segment disclosure is proprietary costs (especially the costs of competitive disadvantage), a full study
should include those companies operation in one industry and one geographic segment in the dichotomisation of companies as voluntary versus non-voluntary disclosure, to examine the firm characteristics, contracting costs and voluntary segment disclosure.

Each of the 185 companies’ annual reports were analysed and the required data were extracted and recorded in the data sheet. Once the recording of the data in the data sheet was completed, the data was keyed into a spreadsheet using the Excel software package. Finally, the data in the Excel spreadsheet is copied over to the SPSS software package for hypotheses testing employing the univariate t-test, a Chi-square test for the categorical variable, the Mann-Whitney U test, and the multivariate logistic regression test.

4.5 The Measurement of the Variables

The measurement for the dependent variable, disclosure, and the independent variables, firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion, used in the data collection and recorded in the data sheet based on the logistic model in the research design is discussed in detail below.

4.6 Disclosure

Disclosure, the dependent variable, is measured as a dichotomous variable. Disclosure is coded 1 for companies that voluntarily disclosed additional segment information over and above the required 3 items of segment data under the old Accounting Standard AASB 1005, namely: segment
revenue, segment results and segment assets, and coded 0 for companies that provided the required 3 items of segment data and companies that disclosed they operated in one industry and one geographical segment.

In measuring the disclosure variable for voluntary and non-voluntary disclosure of segment data, both the industry segments and geographical segments were analysed. A company is considered to be a “voluntary disclosure” firm if it disclosed additional segment data over and above the required 3 items in either its industry segments or geographical segments or in both its industry and geographical segments. This is because some companies only disclosed their industry segments as they operated predominantly in Australia (one geographical segment) and some companies only disclosed their geographical segments as they operated predominantly in one industry segment.

A company is considered to be a “non-voluntary disclosure” firm if it disclosed the required 3 items of segment data in either its industry segments or geographical segments or in both its industry and geographical segments. A company is also considered to be a “non-voluntary disclosure” firm if it disclosed that it operated predominantly in one industry segment and one geographical segment (see pp. 9 - 13 for illustrations).

4.7.1 Firm Size

To test the firm size hypothesis, natural logarithm of total assets is used to proxy for firm size in this thesis. McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) also used natural logarithm of total assets to proxy for the size variable.
McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) included natural logarithm of number of subsidiaries as an additional measure for size. This measure is directly related to both the political visibility and analysts demand for information explanations.

McKinnon and Dalimunthe (1993) argued that corporations with many subsidiaries are likely to have a greater analyst following and also more visible to shareholder interest groups, such as the Australian Shareholders Association and regulatory bodies such as the Australian Stock Exchange and the Australian Securities and Investment Commission (ASIC). Such corporations are likely to be perceived as being more complex, making their activities and performance potentially more difficult for both analysts and special interest groups to understand and evaluate. Therefore, such corporations are more likely to disclose additional information.

The number of subsidiaries or controlled entities of a firm is a measure of the business diversification of the firm. Corporations may control many entities incorporated overseas and therefore have diversified into different geographical segments through their foreign subsidiaries. Alternatively, corporations may have diversified into related or unrelated industries through the nature of the business activities of their subsidiaries. Therefore, the number of subsidiaries arguably reflects the business diversification of the firm rather than information demand by analysts and political visibility.

4.7.2 Industry Membership

Industry membership is measured as a dichotomous variable, coded 1 for companies in the mining and oil classification and coded 0 for the remaining companies.
The oil and gas industry in the USA has been identified as politically sensitive (Watts and Zimmerman, 1978, 1986) and has often been suggested as an industry of strategic importance (Whittred and Zimmer, 1990).

Similarly, the political sensitivity of the oil and mining industry in Australia has also been noted (Sidhu and Whittred, 1992). The strategic importance of the mining and oil industry in Australia could be attributable to its role as an important supplier of energy and raw materials to other industries, a major employer and a major export earner. It is also the subject of intense scrutiny by environmental lobby groups.

The resources industry is arguably subjected to greater political scrutiny than other industries (Ball and Forster, 1982; Craswell and Taylor, 1992). Therefore it is argued that the resources industry is politically sensitive because of its strategic importance and will voluntarily disclose segment information to avoid political costs.

McKinnon and Dalimunthe (1993) and Mitchell et al. (1995) also measured industry membership as a dichotomous variable, coded 1 for mining and oil operations with the remaining companies coded 0.

4.7.3 Minority Interest

In this thesis, the minority interest variable is measured as natural logarithm of one minus the percentage of the subsidiaries of each sample company that are wholly owned.
The higher this percentage figure is, the higher the minority interest. In measuring this variable, the focus is on the number of subsidiaries that had minority interest shareholdings rather than on the magnitude of the minority shareholdings as a conflict of interest can arise between management and the minority shareholders in the subsidiary companies where there is minority interest shareholdings.

McKinnon and Dalimunthe (1993) and Mitchell et al. (1995) also used the conventional calculation of one minus the percentage of the number of the subsidiaries of each company which are 100% owned to measure minority interest.

4.7.4 Financial Leverage

Financial leverage is measured as total liabilities divided by total assets (book value of debt over book value of total assets) in this thesis. This leverage specification is an objective measure.

Various measures for financial leverage have been employed by the authors of the previous voluntary disclosure of segment information studies. McKinnon and Dalimunthe (1993) used the leverage specification of book value of debt plus contingent liabilities over total tangible assets to measure financial leverage. This is arguably a very conservative leverage specification. The inclusion of contingent liabilities in the numerator makes this leverage measure subjective, as noted by Aitken, Hooper and Pickering (1997).

Bradbury (1992) and Mitchell, Chia and Loh (1995) employed the leverage specification of book value of debt over market value of total assets. This specification for financial leverage reflects a going concern measure in
using the market value of total assets as the denominator. It should be noted that the market value of total assets fluctuates with changes in the share price of the equity. However, as noted by Mitchell et al. (1995), there is no means of identifying the most appropriate measure to proxy for financial leverage.

4.7.5 Firm Diversification

The number of segments is used as the proxy for firm diversification. An analysis of the data sheet based on the research model revealed that the 185 firms in the sample displayed segments ranging from a minimum of one segment to a maximum of nine segments.

An additional specification, number of subsidiaries, was initially considered as an alternative proxy for highly diversified firms. The number of subsidiaries controlled by a firm is a measure of the business diversification of the firm. Subsidiaries may be incorporated in Australia or incorporated in a foreign country. Australian companies with foreign subsidiaries signify that they have diversified into other geographical segments. The subsidiaries may be operating in industries that are related or unrelated to that of their parent companies. Here, we see business diversification of the parent companies through their subsidiaries.

The number of subsidiaries is a measure of the amount of subsidiaries controlled by the parent companies. It does not tell us (measure) the number of industry segments or geographical segments that the firm is operating in. Hence, the number of subsidiaries controlled by the firm is not a direct measure of how highly diversified the firm is. The number of segments is a more suitable proxy, so only the number of segments is used to proxy for firm diversification.
The number of segments is selected to proxy for firm diversification because the number of segments (industry or geographical) is a direct measure of the various different industry segments or geographical segments that the company has diversified into. The number of segments is an objective measure of how highly diversified the firm is as it measures the extent of the diversification of the firm using the number of industry or geographical segments disclosed in the companies annual reports under segment reporting in notes to the financial statements. The higher the number of segments disclosed in the segment information, the more diversified the firm is considered to be.

An analysis of the segment information disclosed in the companies' annual reports revealed that some companies disclosed industry segments and geographical segments and some companies disclosed either industry segments or geographical segments. The companies that disclosed both industry segments and geographical segments have diversified into different industries and geographical regions. The companies that only disclosed industry segments have diversified into different industries but operated predominantly in Australia. Finally, the companies that only disclosed geographical segments have diversified into different countries and geographical regions but operated predominantly in one industry segment.

For companies that disclosed industry segments and operated predominantly in one geographical segment, that is, Australia, the number of segments will be the number of industry segments disclosed. For companies that disclosed geographical segments and operated predominantly in one industry segment, the number of segments will be the number of geographical segments disclosed. For companies that disclosed they operated in one industry and one geographical segment, the number of segments will be one segment.
For companies that disclosed both industry segments and geographical segments, if the number of industry segments is the same as the number of geographical segments, then the number of segments will be the number of industry segments or geographical segments. If the number of industry segments is not the same as the number of geographical segments, then the higher number (between the industry segments and the geographical segments) will be taken as the number of segments (see pp. 3-8 for illustrations).

4.7.6 Ownership Diffusion

Ownership diffusion is measured by the percentage of ordinary shares not held by the top twenty shareholders in this thesis.

The higher the percentage of ownership diffusion is, the more widely held are the company's shares. McKinnon and Dalimunthe (1993) and Mitchell et al. (1995) also measured ownership diffusion by the percentage of ordinary shares held other than by the top twenty shareholders.

4.8 Summary

The research methodology comprises the research design, the sample selection, the data collection, and the measurement of the dependent and independent variables. The research methodology is designed to test a total of six hypotheses in this thesis. The independent variables are firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion. The dependent variable is voluntary disclosure of segment information.
The purpose of the research design is to describe how the six hypotheses will be tested. Descriptive statistics of the "voluntary disclosure" group and the "non-voluntary disclosure" group is designed to examine the statistics of the two groups of companies. The univariate t-test will be performed to provide robust results and a Chi-square test will be performed for the categorical variable. The Mann-Whitney U test will also be run and displayed for comparison purposes.

Pearson correlation is designed to test the presence of multicollinearity between the continuous variables. The multivariate test is the logistic regression. The multivariate logistic regression is a more robust test than the univariate t-test. This is because, in the univariate test, the variable is tested in isolation from the other variables. Logistic regression examines the combined ability of all variables to explain the decision to voluntarily disclose. It provides an indication of the statistical significance of individual independent variables as well as for the overall model.

The sample selection selects the target companies' annual reports from which the data for the hypotheses testing is obtained. The year 2000 annual reports were requested from the companies listed in 2001 *Personal Investor Top 300 Shares*. The first 200 annual reports received is taken as the initial sample of companies for data collection. Fifteen companies were excluded to arrive at a final sample size of 185 companies.

A data sheet based on the research logistic model was designed for collecting and recording the required data to test the hypotheses. Each of the 185 companies annual reports were analysed and the required data were extracted and recorded in the data sheet. The data were keyed into an Excel spreadsheet and copied over to the SPSS software package for hypotheses testing.
Chapter 5

Results

5.1 Introduction

This chapter will first discuss the descriptive statistics relating to the independent variables. Next, the results of the univariate analysis of disclosure decisions are presented and discussed. This is followed by an analysis of the correlations among the independent variables. Lastly, the results of the multivariate logistic regression test are presented and discussed.

5.2 Analysis of the Results

The data sheet comprising the dependent variable of disclosure and the independent variables of natural logarithm of size, industry membership, natural logarithm of minority interest, financial leverage, firm diversification and ownership diffusion, was input into the statistical software package SPSS for data analysis.
5.3 Descriptive Statistics of the Continuous Variables

The descriptive statistics of the independent variables are displayed in Table 1. It was expected that the “voluntary disclosure” companies would

<table>
<thead>
<tr>
<th>Variable (expected relation)</th>
<th>Group</th>
<th>Mean</th>
<th>Median</th>
<th>Min</th>
<th>Max</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnSize (l&gt;0)</td>
<td>1</td>
<td>20.24</td>
<td>20.30</td>
<td>16.71</td>
<td>24.91</td>
<td>1.81</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>19.96</td>
<td>20.12</td>
<td>16.17</td>
<td>22.86</td>
<td>1.60</td>
</tr>
<tr>
<td>LnMinority Interest (l&gt;0)</td>
<td>1</td>
<td>1.65</td>
<td>1.95</td>
<td>0.00</td>
<td>4.33</td>
<td>1.33</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0.94</td>
<td>0.00</td>
<td>0.00</td>
<td>3.84</td>
<td>1.24</td>
</tr>
<tr>
<td>Leverage (1&gt;0)</td>
<td>1</td>
<td>50.44</td>
<td>53.10</td>
<td>10.64</td>
<td>91.88</td>
<td>17.67</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>45.01</td>
<td>48.60</td>
<td>1.41</td>
<td>94.19</td>
<td>20.29</td>
</tr>
<tr>
<td>Diversification (1&gt;0)</td>
<td>1</td>
<td>3.86</td>
<td>3.00</td>
<td>2</td>
<td>9</td>
<td>1.64</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>2.13</td>
<td>1.00</td>
<td>1</td>
<td>7</td>
<td>1.56</td>
</tr>
<tr>
<td>Ownership Diffusion (1&gt;0)</td>
<td>1</td>
<td>35.28</td>
<td>33.64</td>
<td>0.54</td>
<td>75.30</td>
<td>18.67</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>33.73</td>
<td>33.31</td>
<td>0.49</td>
<td>91.30</td>
<td>18.94</td>
</tr>
</tbody>
</table>

*Note.* Group 1 comprises companies which disclose additional segment information or voluntary disclosure companies, n = 65.

Group 0 comprises companies that did not disclose additional segment information or non-voluntary disclosure companies, n = 120.

Min = Minimum. Max = Maximum. SD = Standard deviation.
have significantly greater mean and median values for the continuous variables than the "non-voluntary disclosure" companies. Table 1 shows the mean and median values for the natural logarithm of size, natural logarithm of minority interest, leverage, firm diversification and ownership diffusion are greater for Group 1 (voluntary disclosure companies) than Group 0 (non-voluntary disclosure companies).

5.4.1 Univariate Tests Results

Table 2 presents the results for the univariate analysis. The t-test results revealed that the firm size and ownership diffusion variables are not significant. The minority interest and firm diversification variables are significant at $p < 0.001$. The financial leverage variable is significant at $p < 0.05$. The Chi-square test performed for the categorical variable shows that the industry membership variable is not significant.

Natural logarithm transformation for firm size and minority interest were performed to counter positive skewness in these variables. As natural logarithm for zero values is undefined, a constant was added resulting in a minimum value of one for the minority interest variable. The minimum value of one for the minority interest variable yields a natural logarithm measure of zero.

The Levene's Test for equality of variances indicate that all the continuous variables: natural logarithm of size, natural logarithm of minority interest, leverage, firm diversification and ownership diffusion, conform to a normal distribution. Parametric, in preference to non-parametric, tests are thus employed to provide robust results.
Table 2  
Univariate Analysis of Voluntary Segment Disclosure Decisions

<table>
<thead>
<tr>
<th>Variable</th>
<th>t-test</th>
<th>M-W z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1.098</td>
<td>-0.644</td>
</tr>
<tr>
<td></td>
<td>(0.137)</td>
<td>(0.260)</td>
</tr>
<tr>
<td>Minority interest</td>
<td>3.615</td>
<td>-3.393</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Leverage</td>
<td>1.815</td>
<td>-1.629</td>
</tr>
<tr>
<td></td>
<td>(0.036)</td>
<td>(0.052)</td>
</tr>
<tr>
<td>Diversification</td>
<td>7.065</td>
<td>-6.880</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Ownership diffusion</td>
<td>0.535</td>
<td>-0.588</td>
</tr>
<tr>
<td></td>
<td>(0.297)</td>
<td>(0.278)</td>
</tr>
</tbody>
</table>

Industry membership: Chi-square test $\chi^2 = 1.127$ ($p = 0.144$).

**Note.** Voluntary disclosure companies, $n = 65$.
Non-voluntary disclosure companies, $n = 120$.
Figures in parenthesis are one-tailed probabilities for t-test and Mann-Whitney Test.

The Mann-Whitney Test that is based on ranks and is a non-parametric test was also run. The results is very similar to the t-test results with the minority interest and firm diversification variables significant at $p < 0.001$ and the leverage variable significant at $p = 0.052$. The size and ownership diffusion variables are not significant.
5.4.2 Comparison of the Univariate Test Results

Table 3 presents a comparison of the univariate test results of this thesis with previous studies. The most important univariate test results in this study was strong support being found for the firm diversification variable at \( p < 0.001 \) which differed from the findings of McKinnon and Dalimunthe (1993), and Mitchell, Chia and Loh (1995) where no support was found\(^\text{12}\).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td>( p = 0.000 )</td>
<td>( p = 0.000 )</td>
<td>( p = 0.137 )</td>
</tr>
<tr>
<td>Industry membership</td>
<td>( p = 0.005 )</td>
<td>( p = 0.002 )</td>
<td>( p = 0.144 )</td>
</tr>
<tr>
<td>Minority interest</td>
<td>( p = 0.000 )</td>
<td>( p = 0.000 )</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Leverage</td>
<td>No support</td>
<td>( p = 0.018 )</td>
<td>( p = 0.036 )</td>
</tr>
<tr>
<td>Firm diversification</td>
<td>No support</td>
<td>No support</td>
<td>( p = 0.000 )</td>
</tr>
<tr>
<td>Ownership diffusion</td>
<td>( p = 0.035 )</td>
<td>( p = 0.001 )</td>
<td>( p = 0.297 )</td>
</tr>
</tbody>
</table>

The univariate results of this study also found strong support for the minority interest variable at \( p < 0.001 \), consistent with the results of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995). Support was found for the leverage variable at \( p < 0.05 \) which is consistent with the leverage results of Mitchell, Chia and Loh (1995) but differed from McKinnon and Dalimunthe (1993).
No support was found for the firm size, industry membership and ownership diffusion variables in the univariate results of this thesis. This differed from the findings of the above two previous studies where strong support was found for these three variables.

5.4.3 Discussion of the Univariate Test Results

This thesis employed the Contracting Theory (information costs) to test the firm diversification and firm size hypothesis, Contracting Theory (political costs) to test the industry membership hypothesis and Agency Theory (agency costs) to test the minority interest, leverage, and ownership diffusion hypotheses.

The firm diversification hypothesis was found to be significant at $p < 0.001$ and the firm size hypothesis was found to be insignificant. Information costs have been described as including the full range of collection, processing and dissemination costs, and also the cost of competitive disadvantage. Management have incentives to voluntarily disclose segment information provided the increase in firm value from disclosure will offset the decrease in firm value from proprietary costs. The univariate test results suggest that there is a net benefit for the management of companies with higher levels of diversification to voluntarily disclose additional segment information. No support was found for the firm size hypothesis suggesting that the size of the “voluntary disclosure” companies is not significantly different from that of the “non-voluntary disclosure” companies.
No support was found for the industry membership hypothesis. This suggests that political costs did not affect the mining and oil industry to the extent that voluntary disclosure of additional segment information would benefit the company.

The minority interest and leverage hypotheses were found to be significant at $p < 0.001$ and $p < 0.005$ respectively. This suggests that voluntary disclosure of additional segment information reduces the agency costs that increase with minority interest shareholders in the subsidiaries of the parent company. This also suggests that voluntary disclosure reduces the agency costs of debt.

The ownership diffusion hypothesis was found to be insignificant suggesting that the ownership diffusion of the “voluntary disclosure” companies is not significantly different from that of the “non-voluntary disclosure” companies.

5.5 Correlation Matrix for the Continuous Variables

Table 4 presents the Pearson correlations between the continuous explanatory variables. Some correlation between size and the minority interest, leverage and firm diversification variables exists and is in the range of 0.402 to 0.461. The correlation between minority interest and firm diversification is 0.529. The correlations among the independent variables are less than 0.5 with the exception of minority interest that is correlated to firm diversification at 0.529\(^{13}\).
5.6.1 Multivariate Test Results

Multivariate logistic regression is a more robust test than the univariate T-Test for voluntary disclosure of additional segment information. This is because, in the univariate test, the variable is tested in isolation from the other variables. Logistic regression examines the combined ability of all variables to explain the decision to voluntarily disclose. It provides an indication of the statistical significance of individual independent variables, as well as the overall model.

Table 4
Pearson Correlation Matrix for the Continuous Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>LnSize</th>
<th>LnMinority</th>
<th>Leverage</th>
<th>Diversification</th>
</tr>
</thead>
<tbody>
<tr>
<td>LnMinority</td>
<td>0.432*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leverage</td>
<td>0.402*</td>
<td>0.267*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversification</td>
<td>0.461*</td>
<td>0.529*</td>
<td>0.246*</td>
<td></td>
</tr>
<tr>
<td>Ownership Diffusion</td>
<td>0.027</td>
<td>0.013</td>
<td>0.022</td>
<td>0.020</td>
</tr>
</tbody>
</table>

* Correlation is significant at the 0.01 level (2-tailed).

Note.

LnSize: Firm size. Natural logarithm of total assets
LnMinority: Minority interest in subsidiary companies. Natural logarithm of one minus the percentage of the subsidiaries that are wholly owned
Leverage: Financial leverage. Total liabilities divided by total assets
Diversification: Firm diversification. Number of segments
Ownership diffusion: Percentage of ordinary shares not held by the top twenty shareholders
Table 5 presents the multivariate logistic regression of the voluntary segment information disclosure choice of the 185 sample firms. Model Chi-Square is equal to 52.069 (degrees of freedom = 6; p < 0.001) indicating that the overall model is a significant model. The signs of the coefficients for the variables that had significant explanatory power are in the predicted direction except for the coefficients of the firm size and industry membership variables.

The firm diversification variable is significant at p < 0.001 and the firm size variable is significant at p < 0.005. The negative sign of the coefficient for the firm size variable indicates that larger firms are less likely to voluntarily disclose additional information, or smaller firms are more likely to voluntarily disclose additional segment data. The industry membership, minority interest, financial leverage, and ownership diffusion variables are not significant.

In this thesis, the multivariate logistic regression model tests all the six variables in a combined capacity to explain the voluntary disclosure decision. The firm diversification and firm size variables emerged as the significant variables in the logistic regression model of this thesis. This differed from the univariate test results where the firm diversification, minority interest, and financial leverage variables were significant.

There is a direct relationship between the coefficients produced by logit and the odds ratio produced by logistic. A logit is defined as the log base e (log) of the odds. Logistic regression is in reality ordinary regression using the logit as the response variable. This means that the coefficients in logistic regression are in terms of the log odds. The odds ratio can be computed by raising e to the power of the logistic coefficient.
### Table 5

**Binary Logistic Regression of Voluntary Segment Disclosure Choice**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Exp(B)</th>
<th>Wald</th>
<th>1-tailed probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Expected sign)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant (+/-)</td>
<td>4.012</td>
<td>2.481</td>
<td>55.279</td>
<td>2.616</td>
<td>0.053</td>
</tr>
<tr>
<td>LnSize (+)</td>
<td>-0.378</td>
<td>0.142</td>
<td>0.685</td>
<td>7.141</td>
<td>0.004&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Industry membership (+)</td>
<td>-0.853</td>
<td>0.552</td>
<td>0.426</td>
<td>2.389</td>
<td>0.061</td>
</tr>
<tr>
<td>LnMinority interest (+)</td>
<td>0.132</td>
<td>0.159</td>
<td>1.141</td>
<td>0.686</td>
<td>0.203</td>
</tr>
<tr>
<td>Leverage (+)</td>
<td>0.012</td>
<td>0.011</td>
<td>1.012</td>
<td>1.283</td>
<td>0.128</td>
</tr>
<tr>
<td>Firm diversification (+)</td>
<td>0.753</td>
<td>0.141</td>
<td>2.124</td>
<td>28.500</td>
<td>0.000&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Ownership diffusion (+)</td>
<td>0.003</td>
<td>0.010</td>
<td>1.003</td>
<td>0.096</td>
<td>0.378</td>
</tr>
<tr>
<td>Model Chi-square</td>
<td>52.069</td>
<td>(d.f. = 6; p &lt; 0.001)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% Correctly Predicted</td>
<td>73.5%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wald statistic is the square of the ratio of the coefficient to its standard error.

Model Chi-square measures the significance of the model.

Voluntary disclosers, n = 65. Non-voluntary disclosers, n = 120.

<sup>a</sup> Significant at p < 0.001

<sup>b</sup> Significant at p < 0.005

<sup>φ</sup> Based on a 50% cut off.
The antilog of the coefficient \[\text{Exp}(B)\] is the 'odds ratio' produced by logistic regression. The odds ratio for the firm size coefficient is 0.685. This suggest that larger firms are 0.685 times more likely to voluntarily disclose additional segment information than smaller firms; that is, larger firms are less likely to voluntarily disclose additional segment information than smaller firms.

The most significant variable in the logistic regression model of this thesis is the firm diversification variable with an odds ratio of 2.124. This suggests that firms with higher levels of diversification are 2.124 times more likely to voluntarily disclose additional segment information in a regulated setting than firms with lower levels of diversification.

5.6.2 Discussion of the Multivariate Test Results

The six hypotheses in this thesis were employed to test the contracting theory and agency theory. Specifically, the firm size and firm diversification hypotheses were used to test the contracting theory (information costs). The industry membership hypothesis was used to test the contracting theory (political costs), and the minority interest, financial leverage and ownership diffusion hypotheses were used to test the agency theory (agency costs).

The multivariate logistic regression test results found support for the contracting theory (information costs), but no support for the contracting theory (political costs) and agency theory (agency costs). This suggests that information costs is the dominant factor for management's decision to voluntarily disclose additional segment information in a regulated setting.
According to contracting theory, information costs include the full range of collection, processing and dissemination costs, and also the cost of competitive disadvantage. McKinnon and Dalimunthe (1993), Kelly (1994), Hayes and Lundholm (1996), and Piotroski (1999a) referred to information costs as proprietary costs.

The multivariate test results suggest that management of firms with higher levels of diversification have incentives to voluntarily disclose segment information. Managers are directly rewarded using a variety of stock-based compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to engage in voluntary disclosure under these types of compensation plans to reduce the risk of undervaluation (Healy and Palepu, 2001).

Where there is a demand for private information by financial analysts, investors, shareholders or debtholders, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value as noted by Verrecchia (1983).

The logistic regression results suggest that the increase in firm value from disclosure by firms with higher levels of diversification offset the decrease in firm value from proprietary costs. Where there is a net benefit or an increase in firm value from voluntary disclosure, managers have incentives to disclose additional segment information over and above that required by AASB 1005 Financial Reporting by Segments. This is because an increase in firm value may increase managers’ bonus payments and the value of their share options.

The multivariate test results found that smaller firms were more likely to voluntarily disclose additional segment information than larger firms. Following the same reasons for firms with higher levels of diversification, the
management of smaller firms have incentives for voluntary disclosure. The results suggest that voluntary disclosure by the managers of smaller firms will benefit both the managers and the firm, possibly by an increase in firm value.

Larger firms are less likely to voluntarily disclose additional segment information than smaller firms due to proprietary costs of competitive disadvantage\(^{14}\). Kelly (1994) examined firms’ decision to provide voluntary disclosure of segment information. He concluded that firms with high return on investment are less likely to voluntarily disclose disaggregated data than companies with low return on investment due to proprietary costs of competitive disadvantage.

Hayes and Lundholm (1996) argue that proprietary costs induce firms to provide disaggregated data only when they have similarly performing business segments. Firms with widely varying performance across business segments have incentives to conceal these performance differences from competitors by only reporting aggregate performance.

Piotroski (1999a) examines firms’ decisions to provide additional segment disclosures. He concludes that firms with declining profitability and with less variability in profitability across industry segments are more likely to increase segment disclosures, consistent with the information costs of competitive disadvantage.

5.6.3 Additional Binary Logistic Regression Test

An additional binary logistic regression test was performed on the sample of 118 firms after removing the 67 single segment firms to confirm the results of the full sample of 185 firms. The results of this additional binary
logistic regression test on the 118 firms yielded similar results with the size coefficient negative and significant at p < 0.05 and the firm diversification variable also significant at p < 0.05.

5.6.4 Comparison of the Multivariate Test Results between this thesis and previous studies

Table 6 presents a comparison of the multivariate test results of this thesis with previous studies. The most important multivariate test results in this thesis was strong support being found for the firm diversification variable at p < 0.001 which differed from the findings of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) where no support was found.

Table 6
Comparison of Multivariate Test Results of this thesis with previous studies

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Firm size</td>
<td>p &lt; 0.025</td>
<td>p = 0.01</td>
<td>p &lt; 0.005*</td>
</tr>
<tr>
<td>Industry membership</td>
<td>p &lt; 0.025</td>
<td>p = 0.05</td>
<td>No support</td>
</tr>
<tr>
<td>Minority interest</td>
<td>p &lt; 0.025</td>
<td>No support</td>
<td>No support</td>
</tr>
<tr>
<td>Leverage</td>
<td>No support</td>
<td>p = 0.01</td>
<td>No support</td>
</tr>
<tr>
<td>Firm diversification</td>
<td>No support</td>
<td>No support</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>Ownership diffusion</td>
<td>p &lt; 0.05</td>
<td>No support</td>
<td>No support</td>
</tr>
</tbody>
</table>

Note. *p < 0.005 is negative
The multivariate test results of this thesis also found strong support for the size variable at \( p < 0.005 \) but with the expected sign of the coefficient opposite to the predicted direction. This suggests that larger firms are less likely to voluntarily disclose segment data than smaller firms. This finding differed significantly from the finding of McKinnon and Dalimunthe (1993) and Mitchell et al. (1995) where larger firms are more likely to voluntarily disclose segment data than smaller firms.

No support was found for the industry membership variable in this study which differed from the finding of the above two previous studies where support was found.

No support was found for the leverage variable in this study, consistent with the results of McKinnon and Dalimunthe (1993) but differed from Mitchell et al. (1995). Finally, no support was found for the minority interest - and ownership diffusion variables, consistent with the finding of Mitchell et al. (1995) but differed from McKinnon and Dalimunthe (1993) where strong support was found.

5.6.5 Discussion of the Multivariate Test Results of this thesis in comparison to previous studies

The most important finding of this thesis was strong support being found for the firm diversification hypothesis. No support was found for the diversification into related versus unrelated industries hypothesis by McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995). The difference in this finding may be attributable to the difference in the measurement of the firm diversification variable.
McKinnon and Dalimunthe (1993) employed Chenhall’s (1979) classification of related and unrelated markets and technologies to measure diversification into related and unrelated industries. It appears that the distinction between diversification into related and unrelated industries is based on the subjective criteria of "related market" and/or "technology". Mitchell et al. (1995) employed the STATEX classification of Diverse Industrials and Diverse Resources for identifying diversification into related and unrelated industries. The diversification into related versus unrelated industries in the two previous studies is a dichotomous variable. This thesis employed the number of segments to measure the level of firm diversification and this variable is a continuous variable.

Strong support was found for the firm size variable of this thesis but with the expected sign of the coefficient opposite to the predicted direction. This suggests that larger companies are less likely to voluntarily disclose segment data than smaller companies. This finding differed from the finding of McKinnon and Dalimunthe (1993) and Mitchell et al. (1995) where larger companies are more likely to voluntarily disclose segment data than smaller companies.

The finding of strong support for the firm size variable but with the expected sign of the coefficient opposite to the predicted direction is supported by the information costs (especially the costs of competitive disadvantage) of contracting theory. The expected sign of the coefficient opposite to the predicted direction suggests that the smaller companies are more likely to voluntarily disclose segment information than the larger companies because the benefits from voluntary disclosure for the smaller companies out-weigh the proprietary costs of disclosure.

The larger companies in the sample of this thesis arguably are companies with relatively high return on investment, being selected from the
Top 300 Shares, compared to the samples of the two previous studies comprising diversified firms listed on the ASX (see footnote 14).

The multivariate test results for the firm size variable of this thesis is consistent with the information cost of competitive disadvantage (proprietary costs) of contracting theory, and the findings of Kelly (1994), Hayes and Lundholm (1996), and Piotroski (1999a). Kelly (1994) found that multi-segment firms with high return on investment are less likely to reveal disaggregated data than companies with low return on investment. Piotroski (1999a) examines firms’ decisions to provide additional segment disclosures. He concludes that firms with declining profitability and with less variability in profitability across industry segments are more likely to increase segment disclosures.

Hayes and Lundholm (1996) argue that proprietary costs induce firms to provide disaggregated data only when they have similarly performing business segments. Firms with widely varying performance across business segments have incentives to conceal these performance differences from competitors by only reporting aggregate performance.

No support was found for the financial leverage hypothesis in this thesis, consistent with McKinnon and Dalimunthe (1993) but differed from Mitchell et al. (1995) where strong support was found. A possible explanation for the difference in the financial leverage results is the different proxy measures adopted for financial leverage in this thesis and the previous studies.

The results for the mining and oil (resources) hypothesis in this thesis differed from the two previous studies, namely: McKinnon and Dalimunthe (1993) and Mitchell et al. (1995). No support was found for the industry membership variable in this thesis while strong support was found in these
previous studies. A possible explanation for this difference in results could be attributable to sampling difference between this thesis and the prior studies.

Finally, no support was found for the minority interest and ownership diffusion hypotheses in this thesis, consistent with the results in Mitchell et al. (1995) but differed from the results in McKinnon and Dalimunthe (1993). A possible explanation for the difference in results could be attributable to differences in sample selection.

5.7 Summary

Univariate and multivariate tests were performed on six hypotheses in this thesis. The univariate t-test results provide evidence to support the firm diversification, minority interest and leverage hypotheses. The Chi-square test indicated no support for the industry membership hypothesis.

The Mann-Whitney Test based on ranks and is a non-parametric test was also run. The results was very similar to the t-test results with support found for the firm diversification, minority interest and financial leverage hypotheses but no support for the firm size and ownership diffusion hypotheses.

Multivariate logistic regression tests the combined ability of all variables to explain the decision to voluntarily disclose. It provides an indication of the statistical significance of individual independent variables as well as for the overall model. Model Chi-square is equal to 52.069 (degrees of freedom = 6; p < 0.001) indicating that the overall model is a significant model.
The multivariate logistic regression test results found support for the firm diversification and firm size hypotheses. The minority interest, financial leverage, industry membership and ownership diffusion hypotheses are not significant.

The antilog of the coefficient \(\exp(B)\) is the “odds ratio” produced by logistic regression. The odds ratio for the firm size coefficient is 0.685. This suggests that larger companies are less likely to voluntarily disclose additional segment information than smaller companies. This finding is consistent with the information cost of competitive disadvantage of contracting theory, and also consistent with the research findings of Kelly (1994), Hayes and Lundholm (1996) and Piotroski (1999a).

The most significant variable in the logistic regression model of this thesis is the firm diversification variable with an odds ratio of 2.124. This suggests that companies with higher levels of diversification are more likely to voluntarily disclose additional segment information than companies with a lower level of firm diversification in a regulated setting.
6.1 Introduction

This thesis focused on the firm characteristics motivating diversified companies in Australia to voluntarily disclose segment information in a regulated environment. The examination of economic incentives motivating voluntary disclosure of additional segment information is based on the hypotheses that this disclosure is expected to be greater for firms with particular firm characteristics such as firm size, industry membership, minority interest, financial leverage, firm diversification, and ownership diffusion. These firms, it is argued, have incentives to voluntarily disclose segment data over and above that required by AASB 1005 Financial Reporting by Segments because of benefits such as reduced agency costs and political costs.

6.2.1 Motivation for the Study

This thesis is motivated by the opportunity to study the effects of a different sample of firms, a larger sample size, a different measure for firm diversification, and a regulated setting on voluntary disclosure of financial segment data.
This thesis re-examines the six hypotheses in the McKinnon and Dahmunthe (1993) study under a regulated setting to ascertain whether diversified companies have motivation to provide additional segment data over and above the mandated three items of segment revenue, segment results, and segment assets required by AASB 1005 *Financial Reporting by Segments* effective on or after 30th June 1986 but before the implementation of the revised AASB 1005 *Segment Reporting* effective on or after 1st July 2001. This thesis examines the firm characteristics of firm size, industry membership, minority interest, financial leverage, firm diversification and ownership diffusion.

### 6.2.2 Firm Diversification

A new conception and measurement of the firm diversification variable is used which differed from that of McKinnon and Dahmunthe (1993) and Mitchell, Chia and Loh (1995). The number of segments, which is a continuous variable, measures the firm diversification in this thesis. This is a better measurement as the level of firm diversification can be objectively assessed from the segment information provided in the company's annual reports.

This variable is of particular significance in this thesis as firm diversification is likely to be an important attribute in management's decision to provide voluntary disclosure of additional segment information in a regulated environment. This is because highly diversified firms are likely to have more significant information content for investors. These firms are more likely to disclose private information for which there is a demand, provided there is a net benefit in the voluntary disclosure to the firms.
6.2.3 The Measurement for Voluntary Disclosure

The measurement for voluntary disclosure in this thesis also differed from prior studies as this thesis is conducted under a regulated setting. A company that discloses more than the three mandated items of segment revenue, segment results, and segment assets in its industry segments and/or geographical segments is classified as a “voluntary disclosure” company. A company that did not disclose more than the three mandated items is classified as a “non-voluntary disclosure” company.

6.3.1 Theory Development

The theoretical framework explored and discussed the mechanism of employing compensation contracts and compensation plans to align the interests of management with those of the firm, as well as developed and discussed the effects of information costs of competitive disadvantage and political costs on voluntary disclosure of segment disclosure.

6.3.2 Agency Costs and Compensation Contracts

The theoretical framework employed the agency cost of equity to explain the minority interest and ownership diffusion hypotheses and the agency cost of debt to explain the financial leverage hypothesis. Contracts arise to minimise the costs associated with the conflicts of interest between
shareholders and management and between bondholders and shareholders/management. Voluntary disclosure of segment information can reduce the agency cost of equity and the agency cost of debt as segment information is considered useful information to shareholders and debtholders about the outcomes of decisions made by management.

Compensation contracts are used to solve this agency problem. Managers are directly rewarded using a variety of stock-based compensation plans, such as stock option grants and stock appreciation rights. Managers have incentives to engage in voluntary disclosures under these types of compensation plans. Managers interested in trading their stock holdings have incentives to disclose private information to meet restrictions imposed by insider trading rules. Restrictions on insider trading provide managers with incentives to make voluntary disclosures to correct any perceived undervaluation prior to the expiration of stock option awards.

6.3.3 Information Costs and Voluntary Disclosure

It is assumed that there is information asymmetry between management and shareholders, debtholders and investors. Where there is a demand for private information by investors, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value. Thus management have incentive to voluntarily disclose segment information to facilitate better assessment of the firm's performance.

Information costs is used to explain the firm size and firm diversification hypotheses. Information costs includes the full range of collection, processing and dissemination costs and also the cost of competitive
disadvantage. There are two major forces in the information costs influencing voluntary disclosure: (i) the cost of providing information and (ii) the corresponding associated benefits. Firms will voluntarily disclose segment information provided the increase in firm value from disclosure will offset the decrease in firm value from proprietary costs. This argument is reinforced where there is an increase in firm value as management may be rewarded with an increase in bonus payments and an increase in the value of their share options.

6.3.4 Political Costs and Voluntary Disclosure

Political costs, contracting theory, is used to explain the industry membership (resource classification) hypothesis. The resources industry is politically sensitive and this may be attributable to its strategic importance as a major employer, a major export earner and an important supplier of energy and raw materials to other industries. Certain industries may attract scrutiny from government agencies and special interest groups because of their strategic importance. These companies are more likely to voluntarily disclose segment information in order to reduce the political costs imposed by the government, its regulatory agencies and private interest groups.

6.4 Hypotheses Formulation

Six hypotheses are formulated for testing to facilitate comparison of the results of this thesis with McKinnon and Dalimunthe (1993) and Mitchell, Chia
and Loh (1995). The six hypotheses focus on a test of the contracting theory and agency theory. The firm size and firm diversification hypotheses are used as a test of the contracting theory, information costs. The industry membership hypothesis is employed to test the contracting theory, political costs. The minority interest, financial leverage, and ownership diffusion hypotheses are used as a test of the agency theory.

6.5.1 The Research Methodology

The research methodology comprises the research design, the sample selection, the data collection, and the measurement of the dependent and independent variables. The research methodology is designed to test a total of six hypotheses in this thesis.

6.5.2 The Research Design

The purpose of the research design is to describe how the six hypotheses will be tested. Descriptive statistics examines the statistics of the "voluntary disclosure" and "non-voluntary disclosure" groups of companies. The univariate t-test was performed to provide robust results and a Chi-square test was performed for the categorical variable. The Mann-Whitney U test was also run and displayed for comparison purposes.

Pearson correlation was designed to test the presence of multicollinearity between the continuous variables. The multivariate test is the
logistic regression. The multivariate logistic regression is a more robust test than the univariate t-test. This is because, in the univariate test, the variable is tested in isolation from the other variables. Logistic regression examines the combined ability of all variables to explain the decision to voluntarily disclose. It provides an indication of the statistical significance of individual independent variables as well as for the overall model.

6.5.3 The Sample Selection

The sample selection selects the target companies’ annual reports from which the data for the hypotheses testing is obtained. The year 2000 annual reports were requested from companies listed in 2001 Personal Investor Top 300 Shares. The first 200 annual reports received is taken as the initial sample. Fifteen companies were excluded to arrive at a final sample size of 185 companies.

6.5.4 The Data Collection

A data sheet based on the research logistic model was designed for collecting and recording the required data for hypotheses testing. Each of the 185 companies annual reports were analysed and the required data were extracted and recorded in the data sheet. The data was keyed into an Excel spreadsheet and copied over to the SPSS software package for hypotheses testing.
6.6 The Hypotheses Tests

The univariate tests performed to examine the hypotheses were the independent t-test, a Chi-square test for the categorical variable and the Mann-Whitney U test. The multivariate logistic regression model was used to examine the combined ability of all variables to explain the decision to voluntarily disclose. The model provides an indication of the statistical significance of individual independent variables as well as for the overall model.

6.7.1 Findings of the Study

The following were the major findings of this thesis:

(i) The most important univariate test results in this study was strong support being found for the firm diversification variable at \( p < 0.001 \).

(ii) The univariate test results also found strong support for the minority interest variable at \( p < 0.001 \) and the financial leverage variable at \( p < 0.05 \).

(iii) No support was found for the firm size, industry membership, and ownership diffusion variables in the univariate test results of this thesis.

(iv) The most important multivariate test results in this study was a positive association being found between firm diversification and voluntary disclosure of segment information and is statistically significant at \( p < 0.001 \).
A negative association between firm size and voluntary segment disclosure was found in the multivariate test results and is statistically significant at $p < 0.005$.

No support was found for the industry membership, minority interest, financial leverage, and ownership diffusion variables in the multivariate test results of this thesis.

### 6.7.2 Discussion of the Univariate Test Findings

This thesis employed the information costs, contracting theory, to test the firm diversification and firm size hypotheses. Information costs have been described as including the full range of collection, processing and dissemination costs, and also the cost of competitive disadvantage. Management have incentives to voluntarily disclose segment information provided the increase in firm value from disclosure will offset the decrease in firm value from proprietary costs. The univariate test findings suggest that there is a net benefit for the management of companies with higher levels of diversification to voluntarily disclose additional segment information. The findings also suggest that the size of the “voluntary disclosure” companies is not significantly different from that of the “non-voluntary disclosure” companies.

Political costs, contracting theory, was used to test the industry membership hypothesis. The univariate test findings suggest that political costs did not affect the mining and oil (resources) industry to the extent that voluntary disclosure of additional segment information would benefit the company.
Agency theory was used to test the minority interest, financial leverage, and ownership diffusion hypotheses. The univariate test findings suggest that voluntary segment disclosure reduces the agency costs associated with minority interest shareholders in the subsidiaries of the parent company. The findings also suggest that voluntary disclosure reduces the agency costs of debt. Finally, the findings suggest that the ownership diffusion of the "voluntary disclosure" companies is not significantly different from that of the "non-voluntary disclosure" companies.

6.7.3 Comparison of the Univariate Test Findings with Prior Studies

Strong support was found for the firm diversification hypothesis at $p < 0.001$ which differed from the findings of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) where no support was found. Strong support was also found for the minority interest hypothesis at $p < 0.001$, consistent with the results of McKinnon and Dalimunthe, and Mitchell, Chia and Loh. Support was found for the leverage hypothesis at $p < 0.05$ which is consistent with the leverage results of Mitchell, Chia and Loh but differed from McKinnon and Dalimunthe.

No support was found for the firm size, industry membership and ownership diffusion hypotheses. This differed from the findings of the above two previous studies where strong support was found for these three hypotheses.
6.7.4 Discussion of the Multivariate Test Findings

The multivariate test findings suggest that the management of firms with higher levels of diversification have incentives to voluntarily disclose segment information. Managers are directly rewarded using a variety of stock-based compensation plans, such as stock option grants and stock appreciation rights. Under these types of compensation plans, managers have incentives to engage in voluntary disclosure to reduce the risk of undervaluation (Healy and Palepu, 2001). Also where there is a demand for private information by financial analysts, investors, shareholders or debtholders, its non-disclosure is likely to be interpreted as bad news and hence adversely affect firm value.

The multivariate test findings suggest that the increase in firm value from disclosure by firms with higher levels of diversification offset the decrease in firm value from proprietary costs. Where there is a net benefit or an increase in firm value from voluntary disclosure, managers have incentives to disclose additional segment information. This is because an increase in firm value may increase managers' bonus payments and the value of their share options.

The multivariate test results found that smaller firms are more likely to voluntarily disclose additional segment information than larger firms. This finding suggests that voluntary disclosure by the managers of smaller firms will benefit both the managers and the firm, possibly by an increase in firm value.

The multivariate test findings found support for the information costs, contracting theory, but no support for the political costs, contracting theory, and agency costs, agency theory. This suggests that information costs is the dominant factor for management's decision to voluntarily disclose additional segment information in a regulated setting.
6.7.5 Comparison of the Multivariate Test Findings with Prior Studies

The most important multivariate test findings in this thesis was strong support being found for the firm diversification hypothesis at $p < 0.001$ which differed from the findings of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) where no support was found.

The multivariate test findings also found a negative correlation between firm size and voluntary disclose and is statistically significant at $p < 0.005$. This suggests that larger firms are less likely to voluntarily disclose segment data than smaller firms. This finding differed from the finding of McKinnon and Dalimunthe (1993) and Mitchell, Chia and Loh (1995) where larger firms are more likely to voluntarily disclose segment data than smaller firms.

No support was found for the industry membership hypothesis in this study which differed from the finding of the above two previous studies where support was found. No support was found for the leverage hypothesis in this study, consistent with the results of McKinnon and Dalimunthe (1993) but differed from Mitchell, Chia and Loh (1995). Finally, no support was found for the minority interest and ownership diffusion hypotheses, consistent with the finding of Mitchell, Chia and Loh but differed from McKinnon and Dalimunthe.

6.8 Contributions of the Study

The major contribution of this thesis is in the research findings of the multivariate logistic regression test that:
(i) There is a positive correlation between firm diversification and voluntary segment information disclosure and is statistically significant at \( p < 0.001 \).

(ii) There is a negative correlation between firm size and voluntary disclosure and is statistically significant at \( p < 0.005 \).

(iii) The correlation between industry membership, minority interest, financial leverage, ownership diffusion and voluntary disclosure is not statistically significant.

The research findings contributed to our knowledge that the multivariate test findings of voluntary disclosure of segment data in a regulated setting differed from that of an unregulated setting. The most significant contrast was in the size hypothesis where a statistically significant negative correlation was found in a regulated setting compared to a positive correlation in an unregulated setting.

The research findings also contributed to our knowledge of the importance of information costs of competitive disadvantage on voluntary disclosure of segment data. The multivariate test findings contributed to our knowledge that information costs is the dominant factor affecting voluntary disclosure of segment information in a regulated setting.

This thesis also contributed in the theory development of information costs of competitive disadvantage to explain the incentives behind management's decision to voluntarily disclose segment data in a regulated setting. This thesis also contributed in the development of the firm size and firm diversification hypotheses to highlight the role played by information costs on voluntary segment disclosure.

This study contributed in the research methodology by devising a dichotomous measurement for the dependent variable disclosure in a regulated setting.
setting. This thesis also contributed in the research design by developing a new concept of firm diversification and an objective measurement for the firm diversification variable.

This research study contributed in the research methodology of sample selection. The sample firms were selected from the companies listed in the Australian Stock Exchange top 300 shares traded during January to December 2001. The year 2000 annual reports of these sample firms were requested from the companies and the first 200 full annual reports received was taken as the initial sample of firms. The larger final sample size of 185 companies for hypotheses testing provides more confidence in the validity of the research findings.

This research study and the research findings will benefit a wide variety of users of financial statements, especially, the shareholders, management, debtholders, investors, financial analysts, regulators and researchers. The empirical findings suggest that contracting costs, especially information costs, impact on companies with certain firm characteristics, namely: smaller in size and at a higher level of firm diversification, to voluntarily disclose segment information.

The research findings will have practical implications for the regulators. Accounting policy makers deliberating on mandatory disclosure issues may consider the existence of corporate incentives to disclose information.

Finally, this research study will be of interest to the researchers interested in voluntary disclosure studies as this is a voluntary disclosure of segment information study conducted in a regulated setting. Accounting researchers interested in conducting voluntary disclosure studies may consider conducting their studies in a regulated setting to further contribute to the knowledge in this area of research.
6.9 Limitations and Suggestions for Further Research

A limitation of this study relates to the sample firms and in the hypotheses testing. The sample of firms selected is from the top 300 companies ranked by market capitalisation and listed in the Australian Stock Exchange. The selected sample is therefore not completely representative of all the companies listed in the Australian Stock Exchange as many smaller companies were not included in the hypotheses testing and data analysis.

Another limitation of the study relates to the measurement of the independent variables. The measurements of the independent variables are by proxy measurements and may not be a completely accurate measurement of the independent variables.

Further research can be expanded in two directions. First, firm diversification can further be investigated by using geographical segments as the proxy to measure firm diversification. It is possible that firms that have diversified into different geographical segments frequently describe overseas operations for which investors are likely to have difficulty gathering information. Alternatively, industry segments can be used as the proxy to measure firm diversification.

Secondly, the role of firms with increasing profitability and widely varying performance across business segments on the information content of segment disclosure in a mandated environment offers interesting research possibilities. Research in this area investigates the impact of proprietary costs (information cost of competitive disadvantage) on voluntary disclosure of segment data.
ENDNOTES

1. Early adoption of the revised Accounting Standard AASB 1005 Segment Reporting was not undertaken as an initial survey revealed that no companies early adopted the accounting standard.

2. The measurement for the firm diversification variable is not the number of industry segments plus the number of geographical segments because all single segment firms have one industry segment and one geographical segment, and this would yield 2 segments for a single segment firm.

3. The discussion of the measurement of the variables is to be found in the following page.

4. The sample of 200 companies in this study were collected from companies listed in Top 300 Shares, 2001, February, p. 88; June, p. 100; August, p. 80; September, p. 72; October, p. 86; November, p. 80; December, p. 72.

5. The year 2000 annual reports (year ended from 1st January 2000 to 31st December 2000) were collected from these companies.

6. Only 200 companies from the top 300 companies were contacted to request for a copy of their year 2000 full annual report. The 200 copies of annual reports received constitute the initial sample of companies.

7. The final sample of 185 companies comprised of 65 voluntary disclosure companies and 120 non-voluntary disclosure companies. The 120 non-voluntary disclosure companies comprised of 53 multi-segment companies and 67 single-segment companies.

8. Examples of additional segment data over and above the 3 required items are inter-segment sales, other revenue, abnormal items, depreciation and amortisation, capital expenditure, segment liabilities and segment net assets.
9. This leverage specification is an objective measure as the figures for total liabilities and total assets can be directly extracted from the annual reports.

10. The 65 voluntary disclosure companies are multi-segment firms. The 120 non-voluntary disclosure companies comprised of 53 multi-segment firms and 67 single-segment firms.

11. There are 30 mining and oil companies and 155 non-mining and oil companies in the sample of 185 companies. Of the 30 mining and oil companies, 8 are voluntary disclosure companies and 22 are non-voluntary disclosure companies.

12. Strong support was found for the firm diversification variable in this study as the firm diversification variable, measured by the number of segments, can be objectively measured from the segment information presented in the annual reports after the introduction of the Accounting Standard AASB 1005 Financial Reporting by Segments.

13. The correlations analysis was performed to test the presence of multicollinearity. In this study, the sample size is relatively large with 185 companies and multicollinearity will not be a problem in the multivariate logistic regression test.

14. If the larger firms in the sample are more profitable than the smaller firms, and if firms that are more profitable have higher proprietary costs, then larger firms will be less likely to disclose voluntary segment data than smaller firms.
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