VICTORIA UNIVERSITY OF WELLINGTON

Board structure, ownership concentration and intellectual capital

Meiyi Zhang

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This thesis is dedicated to my beloved parents.
For their endless love, support and encouragement

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STATEMENT OF ORIGINAL AUTHORSHIP

I hereby declare that the work contained in this thesis has been performed and interpreted solely by myself except where due acknowledgement is made. I confirmed that this work has not been submitted to fulfil the requirements for the award of any other degree or qualification at Victoria University of Wellington or any other educational institutions.

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ABSTRACT

This thesis investigates the influence of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure. This thesis is motivated by the limited post-IFRSs (International Financial Reporting Standards) adoption intellectual capital disclosure studies carried out in a less stringent regulatory environment of New Zealand, and limited research addressing the determinants of the level and value relevance of intellectual capital disclosure.

Based on an application of agency theory, cost-benefit theory and value relevance approach, this thesis argues that firm-specific factors are expected to have a significant impact on the level and value relevance of intellectual capital disclosure. Within the agency theory, board structure and ownership concentration mitigate agency costs by enhancing the monitoring function of the board over managers' opportunistic behaviour, which consequently influence the level of intellectual capital disclosure. In addition, as New Zealand has less tough rules in relation to board structure and ownership concentration, it is expected that these relationships will be more easily identified in the New Zealand context. Second, as most of the intellectual capital disclosure is voluntary, this disclosure is subject to a firm's cost-benefit analysis. Cost-benefit theory suggests that a firm should not fully disclose its information unless the benefits outweigh the costs of the disclosure. Therefore, the level of intellectual capital disclosure is also influenced by the factors that determine the costs and benefits of the disclosure. Finally, this thesis adopts the value relevance approach to measure the quality of the disclosure. It is expected that the factors

associated with the level of the disclosure also influence the value relevance of the intellectual capital disclosure.

This thesis is based on a sample of 155 firms listed on the New Zealand Exchange covering a total of 519 firm-years over the period between 1 January 2008 and 31 August 2011. A self-developed disclosure index and multiple regression analysis are employed to test the hypothesised relationships.

Overall, the results indicate that the average level of intellectual capital disclosed by New Zealand listed firms is low and the human capital component is the most frequently disclosed intellectual capital component. The results provide strong evidence that board structure characteristics, including board size and independence, have a significant positive impact on the level of intellectual capital disclosure. There is strong evidence for a non-linear relationship between ownership concentration and the level of intellectual capital disclosure, which is robust to various types of intellectual capital (i.e. human, relational and structural capital). The results show marginal evidence that board gender diversity has a positive impact on the level of intellectual capital disclosure.

In terms of the value relevance of intellectual capital disclosure, only board size has a positive impact on the value relevance of the intellectual capital disclosure. In the individual component analysis, board independence is found to have a significant positive impact on the value relevance of the human and relational capital disclosures.

This thesis provides the most recent evidence on the influence of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure in a less stringent regulatory environment of New Zealand. These findings

have important implications to regulators, and assist information users in the interpretation of the voluntary intellectual capital disclosure.

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GLOSSARY AND ABBREVIATIONS

ASX	Australian Securities Exchange
EBITDA	Earnings Before Interest, Taxes, Depreciation, and Amortisation
GAAP	Generally Accepted Accounting Principles
GICS	Global Industry Classification Standard
IPOs	Initial Public Offerings
IP	Intellectual Property
IT	Information Technology
MW test	Mann-Whitney test
NI	Net Income
NZ IASs	New Zealand Equivalents to International Accounting Standards
NZ IFRSs	New Zealand Equivalents to International Financial Reporting Standards
NZX	New Zealand Exchange
OECD	Organisation for Economic Co-operation and Development
R&D	Research and Development
ROA	Return On Assets
The U.K.	The United Kingdom
The U.S.	The United States

CHAPTER ONE

INTRODUCTION

There has been an increasing concern about the importance of intellectual capital in the process of economic value creation for modern businesses. Intellectual capital disclosure reveals important information for internal managers to understand the hidden value drivers of a business and relevant information for external investors to estimate the market value of a firm. However, the main issue surrounding intellectual capital disclosure is that there is no accounting regulation or mutually agreed framework for intellectual capital reporting. Therefore, a growing body of literature attempts to examine the factors associated with the intellectual capital disclosure.

After several major corporate collapses in the early 2000s, it is emphasised that corporate governance plays a significant role in the financial reporting process of a firm. However, there is limited research on the influence of corporate governance on the level and value relevance of intellectual capital disclosure, especially in a less stringent regulatory environment of New Zealand.

The purpose of this thesis is to investigate the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure in the less stringent regulatory environment of New Zealand.

1.1 Motivation

The nature of firms has significantly changed since the last two decades. Tangible assets are becoming less unique and there is an increased demand for the knowledge-

based investment to maintain the competitiveness of a business. According to Barney (1991), a sustainable competitive advantage must be rooted in some unique or idiosyncratic resource (e.g. patent or trademark) controlled by the firm in dynamic and efficient markets. Similarly, Goldfinger (1997) states that the source of economic value and wealth is no longer the production of material goods but the creation and manipulation of intangible assets. As a result, more investment will be made in human resource, information technology (IT), research and development (R&D) and advertising. Moving to a knowledge-based, technology-intensive economy does not only change an organisation's investment pattern but also the way a firm is valued. In capital market-based accounting research, there is evidence of an increased gap between book and market values (e.g. Lev and Zarowin, 1999; Francis and Schipper, 1999). It is suggested that most of those differences can be explained by the intellectual capital that is not covered in traditional accounting framework (e.g. Brennan and Connell, 2000; Veltri and Silverstri, 2011). As a result of the growing theoretically recognised importance of intellectual capital reporting, there is a need to understand the intellectual capital disclosure behaviour of a firm and its value relevance.

The first motivation of this thesis is the lack of empirical study addressing the factors associated with the level of intellectual capital disclosure. Since there is no accounting regulation or universally accepted accounting framework for intellectual capital reporting, the disclosure of this information is voluntary. Voluntary disclosure studies suggest that corporate governance mechanisms including board structure, ownership concentration and other firm-specific factors significantly affect the level of disclosure (e.g. Ho and Wong, 2001; Eng and Mak, 2003). However, there are only limited

studies extending the research to intellectual capital (e.g. Li et al., 2008; Abeysekera, 2010; Whiting and Woodcock, 2011). The results from those studies are inconsistent and based on small samples, which limits the generalisability of the findings.

Second, this thesis is further motivated by the lack of recent New Zealand research related to intellectual capital disclosure. New Zealand capital market has small size, less tough laws related to corporate governance and limited intervention in shareholders relations. Without too many stringent rules on board structure and ownership concentration of a firm, it is easier to identify the relationship between those factors and the level of intellectual capital disclosure within the New Zealand context. In addition, the recent New Zealand Equivalents to International Financial Reporting Standards (NZ IFRSs) adoption might alter the intellectual capital disclosure behaviour of New Zealand firms as NZ IFRSs contain significant changes related to intangible assets reporting. Consequently, there is a need for a New Zealand study based on the post-IFRSs adoption period sample.

Third, there are only a few studies examining the value relevance of intellectual capital disclosure, especially the determinants of the value relevance of this type of disclosure. Value relevance is considered as one of the proxies for information quality. The theoretical importance of intellectual capital disclosure in capital markets has been well discussed (e.g. Brennan and Connell, 2000; Veltri and Silverstri, 2011). However, the influence of corporate governance mechanisms on the association between intellectual capital disclosure and the market value of a firm has not been thoroughly investigated. Much of the literature focuses on the determinants of level of

intellectual capital disclosure. However, the quantity of the disclosure cannot be used as a proxy for the quality of information (Marston and Shrides, 1991).

1.2 Research questions

This thesis addresses the following two questions:

1. Do board structure and ownership concentration have any impact on the level of intellectual capital disclosure?
2. Do board structure and ownership concentration have any impact on the value relevance of intellectual capital disclosure?

1.3 Theoretical framework

To address the research question, this thesis adopts Jensen and Meckling's (1976) agency theory to explain the impact of board structure and ownership concentration on intellectual capital disclosure. Due to the separation of ownership and control, agency problems arise when managers behave opportunistically in the pursuit of their own interests (Jensen and Meckling, 1976). Because of the information gap between the insiders and outsiders, managers can use their information advantage to exploit the outside shareholders. However, managers' opportunistic behaviour and information asymmetries can be diminished by the increased level and improved quality of corporate disclosure. Prior research identifies that the board of directors and ownership concentration as main determinants of corporate voluntary disclosure (e.g. Cheng and Courtnay, 2006; Leung and Horwitz, 2004). Board of directors is viewed as an important monitoring mechanism to oversight managers' actions (Fama and Jensen, 1983). Ownership concentration determines the incentives of minority and

outside shareholders to collect information and monitor the insiders (Shleifer and Vishny, 1997). In addition, at different ownership concentration levels, the agency problems may arise either between management and shareholders, or between controlling shareholders and minority shareholders.

Second, cost-benefit theory is adopted to identify the link between other non-governance factors and intellectual capital disclosure behaviour. Since much of intellectual capital disclosure is voluntary, a firm will only disclose this information when benefits exceed costs. The costs of disclosure consist of cost burdens and propriety costs (Verrecchia, 1983). The ability of a firm to bear the costs of additional disclosure and the level of the propriety costs are determined by the factors such as firm size, industry and the type of intellectual capital information (i.e. human, relational and structural capital).

The value relevance approach is employed to measure the quality of the disclosure. The value relevance method is one of the best methods to measure the relevance and reliability of the information. Capital market-based accounting researchers (e.g. Ball and Brown, 1968) emphasise the ability of reported accounting information to explain the market price of a company's shares. Value relevance approach is developed to posit the relationship between accounting information including the book value of equity, earnings and other information and the market value of a firm (Ohlson, 1995; Collins et al, 1997). It indicates how well the reported information is related to the market value. As discussed above, intellectual capital is considered to be capable to explain the gap between the book value and the market value of a firm, and how corporate governance mechanisms, including board structure and ownership

concentration, influence the level of this disclosure. Consequently, the value relevance of the disclosure is also expected to be affected by those factors.

1.4 Research methodology

This thesis employs a sample of 155 firms listed on the New Zealand Exchange (NZX) covering a total of 519 firm-years over the period between 1 January 2008 and 31 August 2011. 1 January 2008 is the first date that the information based on NZ IFRSs can be obtained.¹ The annual reports released on 31 August 2011 were the most recent annual reports can be collected when the data collection was completed.

The research instrument used to measure the level of intellectual capital disclosure is a self-constructed disclosure index, which is developed based on the definitions, classifications and indices developed in prior research as well as those in the New Zealand context. The disclosure index adopts Sveiby's (1997) three-dimension intellectual capital classification – human, relational and structural capital, and selects items suggested in various definitions and prior research. The final disclosure index consists of 54 items. Multiple regressions analysis is employed to test the hypotheses regarding the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure.

¹ The effective date of mandatory adoption of NZ IFRSs is for periods beginning on or after 1 January 2007. Therefore the annual reports released on or after 1 January 2008 are based on the new accounting standards. Before this date, annual reports can be based on either the old accounting standards or NZ IFRSs if the firms voluntarily adopted NZ IFRSs earlier.

1.5 Summary of major findings

The findings of this thesis provide a strong support for the positive influence of certain board structure characteristics and ownership concentration on the level and value relevance of intellectual capital disclosure. In terms of the level of intellectual capital disclosure, firms with a larger board and more independent directors are more likely to disclose more intellectual capital information. In addition, this thesis finds a strong support for the non-linear relationship between ownership concentration and the level of disclosure. These results are not sensitive to the type of intellectual capital except for the structural capital. The results also provide marginal evidence that board gender diversity positively relates to the level of intellectual capital disclosure.

With regard to the value relevance of intellectual capital disclosure, the value relevance of overall intellectual capital disclosure is better for the firms with a larger board. This thesis does not document any evidence for the significant influence of other factors on the value relevance of the disclosure. However, in the individual intellectual capital components analysis, the results provide that board size and board independence positively affect the value relevance of human and relational capital disclosures.

1.6 Contributions

The findings presented in this thesis provide important contributions to the understanding of the level and pattern of intellectual capital disclosure and its value relevance. First, this thesis is the first study analysing the intellectual capital disclosure pattern of New Zealand listed firms in the post-IFRS adoption period. The

findings provide the most recent evidence that the average level of overall intellectual capital disclosure is low. Second, this thesis provides evidence for the significant influence of board structure and ownership concentration on the level and value relevance of intellectual capital in a less stringent regulatory environment. Without any explicit regulatory intervention, the findings reveal a more direct impact of board structure and ownership concentration on corporate disclosure. Third, this thesis is not limited to the examination of the quantity (i.e. level) of the disclosure, but also the quality (i.e. value relevance) of the disclosure. This thesis significantly contributes to the literature by providing the insight into the influence of board structure and ownership concentration on the level and value relevance of the intellectual capital disclosure.

The findings of this thesis have important implications for corporate regulators, accounting standards setting bodies, as well as internal and external information users. First, the results highlight the positive impact of certain corporate governance mechanisms (i.e. board structure and ownership concentration) on the level and value relevance of the voluntary intellectual capital disclosure. The implication for corporate regulators is that there is a need for increased strength on the corporate governance rules. Second, the findings indicate that intellectual capital disclosure reveals relevant information to internal and external decision makers. Therefore, another important implication is whether there should be an urgent need for detailed guidelines for intellectual capital reporting. Finally, although intellectual capital disclosure is important, information users must interpret the reported information with caution. Without an accounting standard framework, the reliability and relevance of the information should be questioned.

1.7 Organisation of the thesis

The remainder of this thesis is structured as follows. Chapter two discusses the conceptual issues surrounding intellectual capital disclosure and the characteristics of board structure and ownership concentration in New Zealand. Chapter three reviews the literature relevant to this thesis. Theoretical framework and hypotheses development process are discussed in chapter four. Chapter five describes the sample selection process, study period, research instruments, model development, and the definition of variables used in the models. Chapter six reports the descriptive statistics and hypothesis testing results. This thesis concludes in chapter seven with a summary and discussion of the findings and an overview of the major implications, contributions, limitation of this thesis as well as the suggestions for future research.

CHAPTER TWO

BACKGROUND

This chapter examines the conceptual issues related to intellectual capital and regulation environment in respect of corporate governance in New Zealand. The first section discusses various definitions and classifications of intellectual capital developed in prior research and in accounting standards. The second section introduces the New Zealand corporate governance framework, and explores the main characteristics of board structure and ownership concentration of NZX listed entities.

2.1 Intellectual capital

2.1.1 Definitions and current regulations of intellectual capital

There is no broadly accepted definition of intellectual capital (also known as intangible assets, intangibles or other names). It has been recognised that there is some confusion surrounding the definition and the scope of intellectual capital (Choong, 2008). Various definitions have been developed by professions (accounting standards) and academics (literature) over the past two decades.

Intellectual capital refers to the hidden resources that cannot be easily captured as tangible assets. However, “intellectual capital” is not the only term that can be used to describe such type of assets. Other terms such as “intangible assets”, “intangibles”, and “intellectual property” are also used by various researchers (Choong, 2008). Generally speaking, the term “intangible assets” and accounting standard definition are more frequently used by accounting researchers (e.g. Abdul-Shukor et al., 2008).

On the other hand, non-accounting researchers are more flexible with the terms and definitions used in their research (e.g. Sveiby, 1997; Stewart, 1997 and Roos et al., 1997).

The main accounting standards setting bodies and accounting textbooks usually define intangible assets as identifiable assets, which lack of physical substance, but result from legal or contractual rights and are likely to produce future benefits (Di Tommaso et al., 2004). This definition is also widely adopted by accounting researchers. In New Zealand, as of 1 January 2007 (or 1 January 2005 for voluntary adoption), entities are required to apply NZ IFRSs. New Zealand Equivalent to International Financial Reporting Standard 38 Intangible Assets (NZ IAS 38) provides definition, classification, recognition and accounting treatment guidelines for intangible assets reporting as follows:

The standards:

(a) Defines an intangible asset as an identifiable non-monetary asset without physical substance;

(b) Requires an asset to be treated as meeting the identifiability criterion in the definition of an intangible assets when it :

(i) Is separable, that is capable of being separated or divided from the entity and sold, transferred, licensed, rented or exchanged, either individually or together with a related contract, asset or liability; or

(ii) Arises from contractual or other legal rights, regardless of whether those rights are transferable or separable from the entity or from other rights and obligations.

(c) Requires an intangible asset to be recognised if, and only if:

(i) It is probable that the future economic benefits that are attributable to the asset will flow to the entity; and

(ii) The cost of the asset can be measured reliably.

The definition and recognition rules in NZ IAS 38 are narrow, which only focus on identifiable assets. Unidentifiable intangible assets such as human resource, customer loyalty and company reputation cannot be recognised as intangible assets under the standards because they are not transferable and measureable as required in the standards (Brennan and Connell, 2000). In other words, in accounting research, intangible assets only refer to identifiable assets and are subject to specific recognition and measurement rules in the standards.

On the other hand, knowledge management researchers such as Sveiby (1997), Stewarts (1997) and Roos et al. (1997) provide a much broader view on the scope of intellectual capital (or intangible assets). The scope of this wider view encompasses all non-physical assets that contribute to the competitiveness and the value of firms. Therefore, both identifiable intangible assets (that are regulated by the accounting standards) and unidentifiable intangible assets (that are not regulated by the accounting standards) are included.

The wider approach is adopted more frequently in the knowledge management field. The recognition and measuring methods of intellectual capital under wider approach are mostly developed in universities and literature, so that they are not regulated by accounting standards. Although there is a large body of literature addressing the definition and classification of intellectual capital, a consensus on those issues has not been reached. As stated in Kaufmann and Schneider (2004), models developed in prior literature are too qualitative, and the objectives of those studies are too broad. Intellectual capital researchers usually choose or create their own definitions and classifications to conduct their studies. Despite the lack of a consensus definition, most definitions include terminologies such as knowledge-based assets (e.g. Brennan and Connell, 2000), have no physical existence but are still of value to the company (e.g. Edvinsson and Malone, 1997), knowledge-based resources that determine the competitive advantage of a firm (e.g. Ordonez de Pablos, 2003).

The selection of terms and definitions are not the only factors that cause confusions in intellectual capital studies. Choong (2008) find that there is a lack of consensus on the definition of the term “goodwill”. For instance, in NZ IAS 38, goodwill is identified as a distinct type of intangible assets and has to be disclosed separately from other intangibles assets on the financial statements. The standard categorises goodwill into externally and internally generated goodwill. NZ IFRS 3 Business Combinations (NZ IFRS 3) deals with externally generated goodwill. Paragraph 11 of NZ IAS 38 and Paragraph 51 of NZ IFRS 3 describe goodwill as:

...an asset representing the future economic benefits arising from other assets acquired in a business combination that are not individually identified and separately recognised...

...the excess of the cost of the business combination over the acquirer's interest in the net fair value of the identifiable assets, liabilities and contingent liabilities recognised...

The definition and accounting treatment of internally generated goodwill are set in NZ IAS 38. According to paragraph 49 of NZ IAS 38, internally generated goodwill is defined as “... expenditure is incurred to generate future economic benefits, but it does not result in the creation of an intangible asset that meets the recognition criteria...” The standard requires that “internally generated goodwill shall not be recognised as an asset” because “it is not an identifiable resource (i.e. it is not separable nor does it arise from contractual or other legal rights) controlled by the entity that can be measured reliably at cost”.

By using the definition and measuring rules of goodwill in the accounting standards, accounting researchers only include externally generated goodwill as a component of intangible assets in their studies (e.g. Abdul-Shukor et al., 2008). On the other hand, some researchers do not consider goodwill disclosed in the financial statement as an individual component of intellectual capital because it results from business combinations rather than from wealth creation from knowledge-based assets. For example, intellectual capital disclosure studies such as Guthrie and Petty (2000) and Bontis (2003) do not include goodwill in the scope of their studies. In contrast, for researchers who do not strictly follow the accounting standards, the meaning and

measurement of goodwill are more flexible. For example, Ohlson (1995) defines goodwill as the difference between the market value of the entity and the book value of the entity's identifiable assets. Peasnell (1981) measures goodwill as the present value of future expected abnormal earnings.

For New Zealand firms, the most significant impact of mandatory IFRSs adoption in relation to intangible assets is that internally generated goodwill cannot be recognised in firms' financial statements (NZ IAS 38). Previously, there was no such prohibition in the old Generally Accepted Accounting Principles (GAAP). This change may influence firms' voluntary disclosure behaviour related to intellectual capital disclosure.

While the accounting standards definition of intellectual capital is identified as a narrow definition and the definitions in knowledge management research are much wider, some definitions are developed based on an even much broader view. Hendriksen and van Breda (1992) suggest that cash spent on services should also be identified as intangible assets because they have the same nature as traditional intangible assets. Hendriksen and van Breda (1992) therefore distinguish intangibles into traditional intangibles (e.g. brand names) and deferred charges (e.g. advertising and pre-paid services). However, this approach is less frequently adopted by accounting standards setting bodies and academic researchers.

In summary, there are no general rules for the term use when referring the assets without physical substance. However, "intangible assets" are more commonly appeared in accounting research and accounting standards, whereas "intellectual capital" is used more frequently in knowledge management research. Second,

although there is no widely accepted definition for intellectual capital (or intangible assets), the common features described in most definitions include: no physical existence (e.g. Edvinsson and Malone, 1997), knowledge-based equity (e.g. Brennan and Connell, 2000), determination of a firm's competitive advantage (e.g. Ordonez de Pablos, 2003). Finally, the definition and the scope of goodwill also vary depending on the conceptual framework adopted by the researchers. Following the knowledge management research (e.g. Sveiby, 1997), this thesis adopts a wide approach of intellectual capital that includes all knowledge-based assets being able to create value/competitive advantages to the firm, but excludes externally generated goodwill.

2.1.2 Classifications of intellectual capital

Classification provides a systematic way to measure, report, and interpret intellectual capital. Kaufmann and Schneider (2004), after reviewing several prior research studies, conclude that there is a lack of universally accepted theoretical framework for intellectual capital classification. A number of theories have been developed to categorise intellectual capital (or intangible assets). The selections of classification are significantly different from one study to another. For example, the accounting standards setting bodies classify intangible assets according to their natures and functions. Following the accounting regulatory frameworks, Godfrey & Koh (2001) categorise intangibles into:

- (1) goodwill;
- (2) R&D;
- (3) other identifiable intangible such as patents, brand-name and licences.

Deegan and Samkin (2011) also classify intangible assets based on the functionality.

They split intangible assets into six major categories:

- (1) marketing-related intangible assets (e.g. trademarks, trade dress);
- (2) contract-related intangible assets (e.g. licensing, employment contracts);
- (3) customer-related intangible assets (e.g. customer lists);
- (4) artistic-related intangible assets (e.g. books);
- (5) technology-related intangible assets (e.g. computer software and mask works);
- (6) goodwill.

In recent intellectual capital literature, some classification frameworks are more influential than others. For example, Sveiby's (1997) categorisation is one of the most frequently adopted (or partially adopted) frameworks. Sveiby (1997) describes intellectual capital into three dimensions:

- (1) employee competence;
- (2) external capital;
- (3) internal capital.

Sveiby's (1997) frameworks are directly applied in Li et al. (2008), Bruggen et al. (2009), Abeysekera (2010) and others. Sveiby's (1997) classification is renamed in some of these studies as (e.g. Li et al., 2008; Bruggen et al., 2009):

- (1) human capital;
- (2) relational capital;
- (3) structural capital.

Bukh et al. (2005) modifies the Sveiby's classification into smaller groups:

- (1) employees;
- (2) customers;
- (3) IT;
- (4) processes;
- (5) R&D;
- (6) strategic statements.

Following the majority of intellectual capital studies, this thesis adopts Sveiby's (1997) three-dimension categorisation. First, his classification is one of the most influential frameworks, so that the results based on this framework can be compared with other studies and can be replicated for other purposes. Second, the classification is relatively simple and complete. Finally, the framework provides better linkage between intellectual capital disclosures and firms' strategies.²

² See section 5.2.3 for detailed discussion.

2.2 The nature of board structure and ownership concentration in New Zealand

New Zealand has a well-established legal system and regulated accounting environment as other developed countries (Chay and Eleswarapu, 2001). However, it has its own unique features. New Zealand capital market is relatively small and with less tough regulations (Hossain et al., 2001). A country's regulatory environment influences the characteristics of board structure and ownership concentration of the firms. In New Zealand, as there are less stringent corporate governance rules, the board and ownership structures are more likely privately arranged depending on a firm's size, nature and objectives.

2.2.1 New Zealand corporate governance system and regulations for board structure

The New Zealand Exchange Limited adopted several governance-related amendments and incorporated the Corporate Governance Best Practice Code (the Code) into the NZX Listing Rules in 2003 (the Rules). The amended rules are mandatory for all listed companies, which aim at improving board independence (and the quality of other corporate government mechanisms) of the listed entities. However, the Code is not mandatory and listed entities are required to disclose how well they have voluntarily complied with the Code. It focuses on setting out principles to enhance the investor confidence through enhanced corporate governance and accountability.

As part of the amended rules, the minimum requirements of board size and board independence has been incorporated into the Rules and are mandatory standards for all

listed entities. The Rules define independent director as “a director who is not an executive officer of the issuer and who has no disqualifying relationship” (The Rule 1.6.1). The board structure and disclosure rules include:

3.3.1 The composition of the Board shall include the following:

(a) The minimum number of Directors (other than alternate Directors) shall be three; and

(c) The minimum number of Independent Directors shall be two or, if there are eight or more Directors, three or one-third (rounded down to the nearest whole number of Directors) of the total number of Directors, whichever is the greater.

3.3.2 The Board must identify which Directors it has determined, in its view, to be Independent Directors.

10.5.5 The annual report of an Issuer shall contain:

(j) A statement as to which of its Directors are Independent Directors and which of its Directors are not Independent Directors, as at the balance date of the Issuer.

By complying with those rules, a firm must meet the minimum requirements of the board size and independence as well as disclose this information in its annual report.

In the Code, the principle related to the quality of the board is:

2.4 Directors should undertake appropriate training to remain current on how to best perform their duties as Directors of an Issuer.

Although the compliance of the Code is not mandatory, New Zealand listed entities are encouraged to disclose whether and how they have voluntarily complied with the Code. The disclosure rules regarding the Code compliance is presented as follows. Those disclosure requirements impose some pressure on firms to comply with the suggested practices.

10.5.5 The annual report of an Issuer shall contain:

(h) A statement of any corporate governance policies, practices and processes, adopted or followed by the Issuer; and

(i) A statement on whether and, if so, how the corporate governance principles adopted or followed by the Issuer materially differ from the Corporate Government Best Practice Code or a clear reference to where such statement may be found on the Issuer's public website.

Besides the Rules and the Code, the Corporate Governance in New Zealand Principles and Guidelines (the Principles and Guidelines) issued by the Securities Commission of New Zealand in 2004 also aims at providing a recommended framework for listed entities to set up their own corporate governance systems. According to the Principle and Guidelines, the purpose of the Principles and Guidelines is to improve transparency and efficiency in the capital markets through the high standard of corporate governance practices. The Principles and Guidelines contain nine principles with guidelines. It highlights the role of directors in establishing high standards of

corporate governance that the better structured corporate governance system can be achieved “when directors and boards implement the principles through their structures, processes, and actions, and demonstrate this in their public reporting and disclosure” (Principle and Guidelines, p. 3). In addition, the principles of the Rules are based on agency theory perspectives (Fama and Jensen, 1983), and therefore independent directors are critical to the quality of the board. Further, it has been recognised that it is impossible to develop the best governance model for all entities. Therefore, the Principle and Guidelines encourage the firms to adopt and adapt these principles to suit their own needs. The principle related to the suggestions of board structure is:

Principle 2: board composition and performance (there should be a balance of independence, skills, knowledge, experience, and perspectives among directors so that the board works effectively)

This principle provides suggestions for board independence, size and balance of skills. The principle suggests that the optimum number, independence and qualifications of directors should depend on a firm’s size, nature and complexity of its activities.

From the above summary, it can be seen that the New Zealand regulators do not impose many mandatory standards in relation to the board structure except the minimum requirements of board size and independence for firms. Influenced by the British approach and similar to other Commonwealth and Organisation for Economic Co-operation and Development (OECD) countries, New Zealand adopts a principle-based approach for regulation settings. Therefore, the majority of governance rules in New Zealand set principles that establish guidelines for entities to establish their own corporate rules. However, as mentioned earlier, board size and independent related

rules contain some details and require limited judgement. This is inconsistent with New Zealand's principle-based approach. This might be explained by the following reasons. First, in the 1980's, New Zealand started to consider the U.S. law system as the source of regulatory reform as the increased impact of the U.S. to the world economy. Unlike New Zealand, the U.S. applies the code-based approach, which consists of more detailed rules and requires less judgement. Second, after a number of serious corporate collapses in the early 2000's, the importance of board structure along with the other corporate governance indicators has been recognised by corporate regulators. As a result, there is a need for New Zealand to enhance the strength of corporate governance rules. However, the overall regulation related to the board structure is still less stringent than the U.S. codified law. Therefore, without tough rules, it is assumed that the board structures of New Zealand firms are self-arranged depending on the specific features of individual firms.

2.2.2 Ownership concentration

Corporate share ownership represents the property rights an owner is entitled to. Fan and Wong (2002) summarise three categories of property rights attached to each share: control or voting right, the cash flow right and right to transfer. The value of the share, therefore, depends on how well its property rights are enforced. The enforcement of property rights of the share is affected by both individual owners and the state (Fan and Wong, 2002).

At country level, following *laissez-faire* principle in the U.K. based law, New Zealand law does not intervene into private transactions unless the transactions damage the public safety physically and financially (Parker, 1990). For example, according to

Hossain et al. (2001), it is believed that New Zealand companies should have high ownership concentration because New Zealand does not have statutory takeover code like the United Kingdom (the U.K.) and Australia, and an “equal opportunity rule”, In addition, the New Zealand Company Law provides limited protection relating to the right to transfer for minority shareholders under certain situations (e.g. minority buyout rights).³ Unless there are events triggering minority protection rights, the law does not interfere in minority-majority shareholders relations. As a result of lack of state intervention, the minority-majority shareholders relation in New Zealand is influenced by individual arrangements. Ownership structure plays an important role as it affects owners’ ability and incentives of how private contracts regarding property rights are made and enforced (Fan and Wong, 2002). This thesis provides partial understanding of this relationship through examining the supply and the quality of voluntary intellectual capital information.

2.3 Summary

The first section of this chapter highlights the conceptual issues surrounding the definition and classification of intellectual capital. There is no widely accepted definition and theoretical framework for intellectual capital classification for accounting researchers and professions. This thesis adopts a wide approach in knowledge management research and defines intellectual capital as knowledge-based assets that determine the competitiveness of the firm. Sveiby’s (1997) three-dimension

³ Minority buyout rights set out in section 110-115 of the Company Act 1993 (the Act). Under section 110, shareholders can exercise minority buyout rights when they voted all their voting shares against a special resolution, including (and only) altering the constitution of the company to impose or remove restriction on its activities, approving an amalgamation and approving a “major transaction”. Amalgamations and major transactions are set out in section 219-226 (amalgamations) and section 129 (major transactions) of the Act.

framework is chosen for intellectual capital classification. Specifically, in this thesis, intellectual capital is categorised into three groups: human, relational and structural capital.

The second section describes the characteristic of board structure and ownership concentration of New Zealand listed firms. The recent corporate governance regulation reforms strengthen the minimum requirements regarding board size and board independence for New Zealand listed entities. However, the board structures of New Zealand listed firms are mainly self-established according to their specific needs. In addition, New Zealand does not have tough laws to intervene in shareholder rights and minority-majority shareholders' relationship. As a result, it is believed that the level of ownership concentration of New Zealand firms is the result of individual arrangements among shareholders.

The next chapter reviews the prior literature on intellectual capital disclosure with the focus on the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure.

CHAPTER THREE

LITERATURE REVIEW

In the modern economy, investments in intellectual capital play an important role in maintaining a firm's competitive advantage and value. Most of the substantial differences existing between a firm's market and book values can be explained by the intellectual capital that is not recognised in company financial reports. The growing recognition of the importance of intellectual capital has motivated a large amount of research examining the various aspects of intellectual capital disclosure. This chapter reviews literature relevant to the level and value relevance of intellectual capital disclosure and the determinants associated with the level and value relevance of this disclosure, including board structure indicators and ownership concentration characteristics. An overview of the general intellectual capital literature is provided in section 3.1. Section 3.2 outlines various studies that examine the disclosure patterns and investigate the determinants of the level of intellectual capital disclosure. Section 3.3 analyses the important roles of board structure and ownership concentration played in determining the level of intellectual capital disclosure. Section 3.4 summaries studies examining the value relevance of intellectual capital disclosure and research identifying the influence of board structure indicators and ownership concentration on the value relevance of intellectual capital is provided in section 3.5. Finally, section 3.6 concludes with a discussion of the contributions, gaps and limitations of the literature on intellectual capital disclosure.

3.1 Overview of intellectual capital literature

Intellectual capital plays a significant role in maintaining a business's growth, profitability and competitiveness in the new knowledge-based economy (St-Pierre and Audet, 2011). Adequate intellectual capital disclosure assists decision makers to identify a firm's invisible value drivers. However, most intellectual capital information is voluntarily disclosed because there is a lack of sufficient regulation on intellectual capital reporting. As a result of the absence of accounting regulation, missing information on intellectual capital disclosure can lead to misallocation of resources for internal decision makers (Kaufmann and Schneider, 2004) and inadequate estimation of market value external information users (Lev and Zarowin, 1999). Moreover, without regulations, agency costs are expected to be high in high-technology (high-tech) firms because of the inherent uncertainty of intellectual capital (Alves and Martins, 2010). Agency problems can be mitigated through greater and better corporate disclosure (Jensen and Meckling, 1976). Therefore, it is important to understand corporate intellectual capital disclosure behaviour and the potential factors associated with the level and the quality of this disclosure.

Since the development of intellectual capital in the early 1990's, most research studies, both theoretical and empirical, have attempted to understand the intellectual capital disclosure from different perspectives. Early studies focus on defining, classifying and measuring intellectual capital (e.g. Hendriksen and van Breda, 1992; Roos et al., 1997; Sveiby, 1997; Stewart, 1997). Those studies provide essential conceptual frameworks for later empirical research.⁴ There is a decreasing number of

⁴ These frameworks have been discussed in section 2.1.

theoretical research studies addressing the definition and classification issues in later research. However, as the continuous development of the understanding of accounting, a limited number of literature attempts to update the extent of intellectual capital from traditional understanding. For example, Claver-Cortes et al. (2007) argue that the environmental capital should be part of overall intellectual capital. In their study, a theoretical conceptual framework has been created to analyse corporate environmental information. There are not yet empirical studies investigating environmental intellectual capital.

The focuses of recent intellectual capital studies have moved from theoretical discussion to empirical study. In an attempt to understand intellectual capital disclosure behaviour, there is a variety of empirical research examining the level of corporate intellectual capital disclosure and investigating the determination of the level of disclosure.⁵ To determine the quality of the disclosure, some research focuses on testing its value relevance.⁶ It is argued that the potential problems due to the lack of accounting regulations can be mitigated through the enhanced corporate regulation. Most research emphasises the role of board structure and ownership concentration in the financial reporting process of a firm. Consequently, the level and the quality of intellectual capital disclosure can be improved by controlling the potential factors associated with this disclosure.⁷

⁵ See section 3.2 for detailed discussion.

⁶ See section 3.4 for detailed discussion.

⁷ The influence of board structure and ownership concentration is discussed in more details in sections 3.3 (the level of disclosure) and 3.5 (the value relevance of disclosure).

3.2 The level of intellectual capital disclosure

There is a variety of literature examining the level and the extent of intellectual capital on corporate annual reports. One subset of studies in this research category are country-specific research, which involve companies in Australia (Guthrie and Petty, 2000), Bangladesh (Nurunnabi et al., 2011), Canada (Bontis, 2003), Kenya (Abeysekera, 2010), India (Singh and Kansal, 2011), and Spain (Martin de Castro and Lopez Saez, 2008). Among these studies, it can be concluded that the average levels of intellectual capital disclosure around the world are low. Guthrie and Petty (2000, p. 248-249) have detailed examination of the contents in 20 largest Australian companies' annual reports and find that "the key components of intellectual capital are not reported within a consistent framework when report at all" and "there is no established and mutually agreed framework for reporting intellectual capital by large Australian companies and the accounting profession". In addition, the study shows that only a few enterprises attempt to measure and externally report intellectual capital information.

Consistent with Guthrie and Petty (2000), Bontis (2003), who conducts a similar study but on a larger sample size, analyses intellectual capital on the annual reports of 10,000 Canadian corporations and observes that only limited voluntary information has been disclosed. Bontis (2003, p.16) state that despite the global growing understanding and theoretical recognised importance of the concept, evidence shows that intellectual capital disclosure issue is "just academic discussion" and not "at all that intellectual capital disclosure has garnered any traction" in accounting practices. Further, the average levels of disclosure for firms in developing countries appear to be

lower than that in developed countries. It has been found that firms in Bangladesh fail to disclose many important items such as patents, trademark and copyrights (Nurunnabi et al., 2011), whereas in developed countries (e.g. Australia and Canada), intellectual property is the most frequently disclosed items (Guthrie and Petty 2000; Bontis, 2003).

Some studies focus on the disclosure patterns for firms in specific industries. Pike et al. (2002) suggest that intellectual capital have a significant impact on enterprises valuation for companies such as high-tech and professional service firms. Following Pike et al. (2002), industry-specific empirical studies target at high-tech industries as a whole (e.g. Martin de Castro and Lopez Saez, 2008), biotechnology companies (White et al., 2010), pharmaceutical companies (e.g. Singh and Kansalv, 2011), and telecommunications (e.g. Gerpott et al., 2008). Singh and Kansalv (2011) investigate the voluntary intellectual capital disclosure in top 20 listed pharmaceutical companies in India and find that the level of intellectual capital disclosure is low, narrative and varying significantly among companies. Most of those studies apply Sveiby's (1997) three-dimension framework (human, relational and structural capital) and compare the disclosure levels in each category. Martin de Castro and Lopez Saez (2008) test the intellectual capital disclosed by high-tech firms in Spain and find that human capital appears as the most influential components, followed by structural capital and relational capital. However, Gerpott et al. (2008), who conduct their studies based on telecommunication firms, document that relational capital such as customers, suppliers and investors have the highest disclosure frequency.

While much of research focuses on country-specific or industry-specific studies, a few studies contribute the existing literature by providing comparisons of disclosure patterns between two groups (e.g. Kianto et al., 2010; White et al., 2010). Kianto et al. (2010) compare disclosure levels between service-oriented and product-oriented companies, whereas White et al., (2010) analyse differences in disclosure patterns for biotechnology companies in Australia and the U.K. Both studies demonstrate that the nature and extent of intellectual capital disclosure significantly associate with industry and country effects. This may explain the various disclosure patterns observed in previous research.

As there is no regulation of intellectual capital reporting around the world, much of research has been conduct to find significant factors that affect the level of intellectual capital disclosure. Studies follow the same process as the research on the determination of voluntary disclosures. Therefore, factors that affect the voluntary disclosure are likely to have similar effects on intellectual capital disclosure. Two main theories provide fundamental frameworks to structure those studies. Cost-benefit theory suggests that the main factor determining the corporate disclosure policy is that the benefits associated with the disclosure must outweigh its costs. Research based on this theory suggests that the costs and benefits of the disclosure are determined by firm-specific characteristics such as firm size, performance, leverage, listing status and others (e.g. Garcia-Meca et al. ,2005; Sonnier et al., 2007; Bruggen et al., 2009; White et al., 2010 and Whiting and Woodcock, 2011). On the other hand, researchers that argue based on the agency theory suggest that corporate governance mechanisms such as board structure and ownership concentration have a significant impact on corporate disclosure policies (e.g. Abeysekera, 2010; Singh et al., 2008; Hidalgo et al.,

2011). Those studies also include non-corporate governance firm-specific characteristics in their models, but only as control variables.

Some studies tests less common factors that potentially influence the level of intellectual capital disclosure. In a Spanish study, Garcia-Meca et al. (2005) include a number of less frequently tested factors such as market to book ratio, political visibility and the nature of the firm's presentation. This study provides evidence that market-to-book ratio is associated with the level of disclosure. This result is consistent with the argument that intellectual capital contributes to the gap between book and market values. Garcia-Meca et al. (2005) state that firms with hidden intangible values need to disclose a wider range of voluntary non-financial information because of the information asymmetry existed between managers and investors. Their study also finds that intellectual capital is commonly disclosed in company presentations rather than result presentations. Political visibility, however, is not significant for Spanish listed companies.

While much of literature uses single measurement for each factor, Sonnier et al. (2007) examine the influence of two types of performance measurement namely Net Income (NI) and Earnings Before Interest, Taxes, Depreciation, and Amortisation (EBITDA) on the level of intellectual capital disclosure. They document that tests conducted in different measurement methods show different relations to the level of intellectual capital disclosure.

In summary, there is no generally accepted reporting framework for intellectual capital reporting. Researchers develop their own methods to measure and identify the level and extent of intellectual capital disclosure. Previous research finds that

intellectual capital disclosure has narrative nature and the concept has not been widely applied in corporate practices. In addition, the patterns of this disclosure are significantly associated with country and industry effects. Therefore, the results from prior research need to be interpreted with caution because the findings vary depending on the sample selection and measurement methods.

3.3 Board structure, ownership concentration and the level of intellectual capital disclosure

After a number of serious corporate collapses in the early 2000's, the importance of corporate governance in financial reporting process has been emphasised by both academic researchers and corporate regulators. Consequently, there is an increasing in the number of research investigating the effects of corporate governance on the corporate disclosure in annual reports. Agency theory is one of the main theoretical perspectives adopted in the corporate governance and corporate disclosure studies. The theory suggests that corporate governance plays an important role in shareholder value protection, especially for protecting outsider investors from the expropriation by the insiders (La Porta et al., 2000).

Board structure and ownership concentration have been identified as two of the most important corporate governance mechanisms to determine the efficiency of monitoring function of the board over a company's top management. Prior corporate governance literature argues that a well-structured board and an optimal ownership concentration level provide more efficient mechanisms for outsiders to monitor the operation of insiders, and thus reduces agency problems raised as a result of the separation between ownership and control. Most of the board structure and disclosure

literature tends to focus on the influence of a single factor or the combination of board size, independence and chief executive officer-board chairperson duality (CEO duality) on the level of corporate disclosure.

Fama (1980) suggests that the main determinant of the board as an effective monitor of managers' opportunistic behaviour is the balance of insider and outsider individuals on the board. Internal managers provide valuable firm-specific information, which assist the top decision makings, whereas outsiders act as arbiters who monitor important decisions and ratify decisions when serious agency problems are involved (Fama and Jensen, 1983). Following the theoretical arguments made by Fama (1980) and Fama and Jensen (1983), numbers of empirical studies examine the relationship between board structure characteristics and a variety of corporate disclosure.

Forker (1992) and Chen and Jaggi (2000) find empirical evidence to support the positive relationship between the proportion of non-executive directors and corporate disclosure. Forker (1992), as one of the earlier studies, tests the relationship between board composition and share option disclosures, whereas Chen and Jaggi (2000) focus on the mandatory disclosures.

Much of the later disclosure studies focus on voluntary disclosure because it is assumed that companies have complied with the mandatory requirements. Inconsistent with Forker (1992) and Chen and Jaggi (2000), Ho and Wong (2001) and Eng and Mak (2003) find no evidence to support Fama (1980) and Fama and Jensen (1983). Both studies examine the influence of non-executive directors on voluntary disclosure in the Asian capital markets. Ho and Wong (2001) investigate the impact of a series of board structure indicators including the proportion of independent non-executive

directors, existence of dominant personalities and proportion of family members on the board on the extent of voluntary disclosure in Hong Kong. Eng and Mak (2003) test the relationship between the proportion of outside directors and the level of voluntary disclosure for listed firms on the Stock Exchange of Singapore. Ho and Wong (2011) do not find evidence that board independence and CEO duality are significantly related to the extent of voluntary disclosure. Eng and Mak (2003) document a negative relationship between board independence and the level of disclosure. However, a later study conducted by Cheng and Courtnay (2006) who examine the same capital market as Eng and Mak (2003) find a positive association between the proportion of independent directors and voluntary disclosure. Cheng and Courtnay (2006) suggest that the results in Eng and Mak (2003) might be driven by the inclusion of grey directors, which are commonly excluded from independent directors in most studies.

Besides board size, independence and CEO duality, additional factors are also included depending on the specific characteristic of the selected capital markets. For example, Ho and Wong (2001) extend the prior research by including the proportion of family members on board when studying the Hong Kong capital market because most Hong Kong listed firms are family owned. They observe that the percentage of family members on board is significantly correlated with the extent of voluntary disclosure. As the development of the literature, other aspects of board factors have also been introduced. For instance, Arcay and Vazquez (2005) conduct additional tests on whether stock option plans as directors' remuneration is associated with voluntary disclosure and find evidence that the establishment of stock option plans have a significant impact on the level of voluntary disclosure.

Similar to board structure, ownership concentration is another frequently investigated corporate governance indicator in disclosure studies. Voluntary disclosure studies such as Mitchell et al. (1995), Chau and Gray (2002), Eng and Mak (2003), Leung and Horwitz (2004) employ a variety of ownership structure measures to study the association between ownership concentration and voluntary disclosure.

Mitchell et al. (1995) investigate the extent to which voluntary segment disclosure is related to ownership concentration along with other firm-specific characteristics. They find some support for the inverse relation between ownership concentration and the level of disclosure. Similarly, Chau and Gray (2002) study the relationship between ownership concentration and family ownership and voluntary disclosure for both Hong Kong and Singapore companies. The study finds that wider ownership is positively associated with the extent of voluntary disclosure, and family-controlled companies have little motivation to disclose voluntary information.

Instead of examining the effect of ownership concentration, Eng and Mak (2003) and Leung and Horwitz (2004) investigate the relationship between a series of ownership types such as managerial ownership, blockholder ownership and government ownership, and voluntary disclosure. Eng and Mak (2003) observe that lower managerial ownership is associated with greater voluntary disclosure, whereas government ownership is positively related to the level of disclosure. This study does not find strong evidence that blockholder ownership is related to voluntary disclosure. This finding is different from the results documented in Leung and Horwitz (2004), which only examine the relationship between a single ownership type of director ownership and voluntary disclosure for Hong Kong companies. Leung and Horwitz

(2004) find a non-linear relationship between director ownership and voluntary segment disclosure that director ownership is positively associated with voluntary disclosure at lower level (below 25%) but the relationship becomes negative when director shareholding is high.

Following Eng and Mak (2003) and Leung and Horwitz (2004), in a recent New Zealand studies, Jiang and Habib (2009) examine the influence of different categories of ownership types on corporate voluntary disclosure practices. Four types of ownership structure are tested: financial institution, governmental, managerial and other company ownership. Similar to Leung and Horwitz (2004), Jiang and Habib (2009) hypothesise a non-linear relationship between ownership concentration and voluntary disclosure. The result shows that different types of ownership concentration affect corporate disclosure in various ways. Financial institution ownership has a negative (positive) impact on corporate disclosure at high (low) ownership concentration levels, whereas governmental and managerial ownership influence positively (negatively) on voluntary disclosure at high (low) ownership concentration levels.

As the development of the concept of intellectual capital, a branch of voluntary disclosure and corporate governance research tends on investigating the impact of corporate governance indicators on the level of intellectual capital disclosure. Similar to general voluntary disclosure studies, it has been found that board structure and ownership concentration are the major corporate governance mechanisms associated with the intellectual capital disclosure (e.g. Li et al., 2008; Abeysekera, 2010; Hidalgo et al., 2011; Whiting and Woodcock, 2011). The sample companies in those studies

include both developing capital markets such as Kenyan (Abeysekera, 2010) and Mexican (Hidalgo et al., 2010), and more regulated stock markets including the U.K. (Li et al., 2008) and Australia (Whiting and Woodcock, 2011).

The evidence on the relation between board structure, ownership concentration and intellectual capital disclosure are mixed. Abeysekera (2010) only examines the effect of board size on intellectual capital disclosure for Kenyan companies. The result indicates that companies with a larger board tend to disclose more human capital resources. Hidalgo et al. (2011) conduct a series of hypotheses and conclude that board size is significantly positively related to the level of intellectual capital disclosure, but increase in institutional investor shareholding hinders the level of this disclosure for Mexican companies. Similar to Leung and Horwitz (2004), Hidalgo et al. (2011) extend the analysis to test the non-linear relationship between board size and intellectual capital disclosure and confirm this relationship with empirical evidence. Li et al. (2008) investigate both board structure and ownership concentration indicators including the proportion of independent non-executive directors, CEO duality, ownership concentration, and find that the proportion of independent directors is positively related to intellectual capital disclosure, share concentration is negatively associated with the disclosure and no evidence shows that role duality have any impact on intellectual capital disclosure. Whiting and Woodcock (2011) conduct an Australian studies and find ownership concentration is not significant correlated with the intellectual capital disclosure.

Those studies have made specific contributions to the literature. First, instead of one measurement, Li et al. (2008) use three dimensions to measure the level of intellectual

capital disclosure. This measurement method overcomes the limitations of using a single factor to determine the level of intellectual capital. Further, Abeysekera (2010) provides detailed analysis of how individual intellectual capital components such as human capital have been influenced by corporate governance mechanisms. Finally, Whiting and Woodcock (2011) is the first Australian study to investigate a large number of firm-specific factors and intellectual capital disclosure for a diverse group of industries.

While much of research examines disclosure in annual reports, Singh and van der Zahn (2008) gain insight into the intellectual capital disclosure in the resource other than annual reports. They study the determination of intellectual capital disclosure in prospectuses of initial public offerings (IPOs) in Singapore Stock Exchange between 1997 and 2006. However, the study does not find any significant effect of adopting good board structure practices on intellectual capital disclosure prospectuses of IPOs.

Because intellectual capital is a relatively newly developed concept, there has been only limited research further addressing the effect of board structure and ownership concentration on intellectual capital disclosure. In addition, the conclusions drawn from most of intellectual capital studies are from relatively small samples. For example, Li et al (2008) examine 100 U.K. listed firms. Abeysekera's (2010) study is based on top 26 of the 52 Kenyan listed firms. Whiting and Woodcock (2011) use one year annual reports from 70 Australian publicly listed firms. Moreover, most of those studies are based on pre-IFRSs adoption data or do not consider the effects of the IFRSs adoption on the intellectual capital disclosure. Even though the IFRSs do not specifically address the issues of intellectual capital disclosure, the changes in

intangible accounting may influence the pattern of intellectual capital disclosure. Finally, the majority indicators used in board structure are limited to board size, independence and CEO duality. Other measures for board characteristics such as board experts and gender diversity are less frequently considered in the literature. This thesis only reviews board structure and ownership concentration research. Other factors associated with intellectual capital disclosure are not within the scope of this review.

3.4 The value relevance of intellectual capital disclosure

Value relevance is one of the indicators for the quality of information. It measures the extent to which information will map onto the market value of equity. As the modern economy began to develop, it has been found that there was a significant decrease in the usefulness of corporate reported financial information to the information users. Lev and Zarowin (1999) document that the association between reported earnings and stock returns experienced a dramatic decrease between the 1950's and 1980's. They argue that the growing importance of intangible assets to the business could be a significant factor driving the gap between book value and market value. Following Lev and Zarowin (1999), Francis and Schipper (1999) observe a similar result of a decline in value relevance of accounting information over time. In addition, Francis and Schipper (1999) also find that the explanation power of the reported accounting information on market valuation is significantly higher for low-technology (low-tech) firms than for high-tech firms. Therefore, it is suggested that there is a need for a more comprehensive, more reliable and more relevant framework on intangibles reporting (Lev and Zarowin, 1999).

There is a variety of value relevance of intangibles studies investigating how well the reported intangibles information is related to the market value. Much of the literature focuses on the value relevance of quantitative information of a single item. Intangible asset items such as R&D (e.g. Ben-Zion, 1984; Chauvin and Hirschey, 1993; Lev and Sougiannis, 1996; Nekhili et al., 2010 and others), advertising and brands (e.g. Jose et al., 1986; Chauvin and Hirschey, 1993; Smiddy, 1993) and computer system (e.g. Aboody and Lev, 1998) are considered as main drivers to the differences between reported information and market value.

R&D is identified as one of the most significant indicators of innovation in the modern economy. Consequently, it is the earliest and most frequently examined item. As one of the earliest studies, Ben-Zion (1984) provides early evidence that the difference between market value and book value is correlated with R&D expenditure. Because R&D can be either capitalised or expensed, a number of studies examine the value relevance of R&D reported under different accounting choices. For example, Lev and Sougiannis (1996) find evidence that capitalisation of R&D costs is positively associated with stock prices and returns. Chauvin and Hirschey (1993), on the other hand, document that R&D expenditures are positively related to market value of firm. More recently, Nekhili et al (2010), based on the conclusions from previous research that R&D expenditures (e.g. Chan et al., 2001; Hall & Oriani, 2006) and voluntary information (e.g. Haggard et al., 2008; Hassan et al., 2009) lead to higher market value, they construct their own hypotheses and confirm that better R&D voluntary disclosure has a positive impact on firm's market value by examining 85 French listed firms over the period from 2000 to 2004.

Jose et al. (1986) and Chauvin and Hirschey (1993) examine how well advertising expenditures are related to a firm's market value. Advertising is aimed at increasing the stock of an organisation's intangible assets such as brand equity or customer loyalty (White and Miles, 1996). Therefore, advertising expense should be value relevant to firm's future performance. Jose et al. (1986) only find limited evidence that promotion (advertising) has impacted the value of the firm. Chauvin and Hirschey (1993), on the other hand, provide evidence that advertising expenditures have large, positive and consistent influence on the market value of the firm. Similarly, Smiddy (1983) argue that brand cannot be ignored as an asset as it creates long-term profits. In addition, Smiddy (1983) state that most managers consider brands as one of the most relevant determinants of market value of a firm. However, there is a lack of empirical studies relating the association between brands and a firm's market value.

Aboody and Lev (1998) is one of a few papers addressing the value relevance of the information technology disclosure. Aboody and Lev (1998) examine a sample of 163 firms during the period of 1987 to 1995 and find a positive association between capitalised development costs and returns and future earnings. However, the lack of research on this subject limits the scope of interpretation of results in Aboody and Lev (1998).

Unlike above studies that focus on single items, Abdul-Shukor et al. (2008) extend the enquiry by investigating the value relevance of non-current intangibles in different economic conditions and accounting environments. Inconsistent with prior studies, Abdul-Shukor et al. (2008) find that reported non-current intangibles is negatively associated with firm share prices for Malaysian listed firms during the financial crisis

period from 1997 to 1998. Although the findings are unexpected, they argue that the results are not surprising as it is consistent with the theory that intangibles reflect uncertain expected future cash flows. In addition, Cazavan-Jeny and Jeanjean (2006) also find that capitalised R&D costs are significantly and negatively associated with stock prices and returns for French listed companies.

Up to this point, much of the literature focuses on identifiable intangible assets only. In other words, only the intangible assets that can be quantified have been investigated. There is limited literature examining the value relevance of non-identifiable intangible assets (or intellectual capital). Unlike identifiable intangible asset items, there is no accounting reporting framework for those items and they can only be disclosed in narrative terms. One of the earliest studies, Amir and Lev (1996) argue that the financial information is of limited value to investors in a fast-changing and technology-based industry. They find that financial information combined with non-financial information contributes to the explanation of stock prices and non-financial information is more informative for science-based, high-growth sectors. However, this study only examines some randomly selected non-financial intangibles.

More recently, Nekhili et al. (2010) and Veltri and Silvestri (2011) use a self-developed disclosure index to test the value relevance of non-quantitative intangible assets/intellectual capital disclosure. Nekhili et al., (2010) focus on R&D disclosure only, whereas Veltri and Silverstri (2011) examine the relationship between intellectual capital disclosure and market price for Italian listed firms. The study proves that human capital is more value relevant to investors than structural capital information, and human capital turns to be more efficient when it inter-relates with

other intellectual capital components. The result is consistent with Sveiby (1997) that people are fundamental capital of a firm as only people can create external and internal structures. Vafaei et al. (2011) examine value relevance of intellectual capital disclosure. Based on a content analysis of the text in annual reports sampled from listed companies in Britain, Australia, Hong Kong and Singapore, they find that the disclosure is positively associated with the market price of companies in two of the four countries (Britain and Hong Kong). However, Maditinos et al. (2011) investigate the impact of intellectual capital on firms' market value and financial performance for Greek companies and they do not find strong evidence to support their expectation.

While majority of literature examines the relationship between reported information and market value under stable political settings, Abdul-Shukor et al. (2008) and Abeysekera (2011) propose that macroeconomic factors may intervene into book to market value relationship. Abdul-Shukor et al. (2008) find evidence that the book to market value relationship is different in financial crisis and non-financial crisis period. Abeysekera (2011) compares the relationship between intellectual capital disclosure and market value in two unstable political periods: civil war period and temporary truce period. The study finds that even though investors do not include intellectual capital information in the valuation process in both periods, the investors become somewhat optimistic about future prospects of firms due to less stress imposed by the political environment in the temporary truce period.

In a New Zealand study, Whiting and Miller (2008) conduct content analysis of 70 publicly listed firms and investigate the relationship between the level of hidden value and the voluntary disclosure of intellectual capital. The study measures hidden value

as the difference between market value and book value and find positive relationship between hidden value and the level of intellectual capital disclosure. The results are based on pre-IFRSs adoption sample. Considering the adoption of IFRSs in New Zealand may have some influence on the intellectual capital disclosure of the firm, this relationship might be altered in the post- IFRS adoption period.

3.5 Board structure, ownership concentration and the value relevance of intellectual capital disclosure

A stream of value relevance research attempts to determine the factors that may influence the quality of accounting information. It is suggested that one of the positive impacts of adopting good corporate governance practices is to improve the quality of accounting information. Therefore, this study is build on the literature that examining the effects of corporate governance mechanisms such as board structure and ownership concentration on the value relevance of reported accounting information.

Beeker and Brown (2006) find evidence that better-governed firms do make more informative disclosure by examining corporate disclosures of top 250 Australian firms. The corporate governance score is based on the quality of the board and its principal committees. However, this study uses secondary resource for corporate governance ranking and it does not test how good governance structure was defined.

In a recent Australian study, Habib and Azim (2008) examine the relationship between corporate governance structure and the value relevance of accounting information. They test two types of quantitative information: book value of equity and earnings. With regard to corporate governance mechanisms, this study focuses on a

series of board structure and audit committee indicators, excluding the factors that are irrelevant in the Australian context. Consistent with Beeker and Brown (2006), the study finds evidence that better corporate governance structures improve the value relevance of accounting information.

However, there are a number of empirical studies which do not find any evidence to support the theoretical argument of the importance of board and ownership structure to a firm. Hermalin and Weisbach (1991) do not find any significant relationship between board structure, ownership concentration and firm value. Consistent with Hermalin and Weisbach (1991), Bhagat and Black (1999) investigate the association between board structure and firm performance measured by a number of proxies but do not find any significant relationship between the two measures. Moreover, some studies show that board characteristics may have a negative impact on a firm's market value. Yermack (1996) and Vafeas (2000) find that large boards are negatively associated with firm value.

There is very limited research examining the impact of board structure, ownership concentration on the value relevance of intellectual capital disclosure. Moreover, the question of how corporate governance mechanisms affect the value relevance of intangible disclosures is examined indirectly in prior research. For example, in Nekhili et al. (2010), instead of testing the direct effect of corporate governance mechanisms on the value relevance of R&D disclosure, they test whether corporate governance mechanisms alter the relationship between R&D voluntary disclosure and market value through influencing the level of R&D disclosure. The study first proves that better disclosure improves a firm's market value. In the second part of study, they

find that the existence of audit committee have a significant impact on the R&D voluntary disclosure. Other mechanisms such as board independence, CEO duality, audit firm's size do not influence the level of R&D voluntary disclosure, and thus not altering the relationship between market and reported information.

3.6 Summary

This literature review outlines a number of current issues surrounding intellectual capital disclosure including the importance and the problems of intellectual capital reporting, the level of intellectual capital disclosure along with the determinants of the level of this disclosure, and the value relevance of intellectual capital disclosure as well as the potential factors that influence the value relevance of this disclosure. This literature review identifies a number of gaps and limitations of the current intellectual capital research. First, the inconsistent results found in prior research make it difficult to generalise the findings to other context and different regulatory settings. Country effects might be related to the characteristics of intellectual capital disclosure (White et al., 2010). Limited research has been conducted in the New Zealand context. Therefore, there is a need for New Zealand studies in order to understand the intellectual capital disclosure behaviour, specifically for New Zealand firms.

Second, most of the research studies examine the intellectual capital disclosure in the pre-IFRSs adoption period or does not consider the potential influence of IFRSs adoption on the level of intellectual capital disclosure. The international standards have made few changes regarding intangible assets reporting, which may influence the patterns of voluntary intellectual capital disclosure.

Third, as the result of the absence of regulations, most research examines the association between corporate governance and other firm-specific factors, and voluntary intellectual capital disclosure. In terms of corporate governance, board structure and ownership concentration are two of the most influential factors associated with the disclosure level. However, the results of these studies are inconsistent. According to Shleifer and Vishny (1997), corporate governance can be altered through political process. Consequently, the effect of board structure and ownership concentration on intellectual capital disclosure might be influenced by the macroeconomic environment and regulatory intervention. Therefore, again, there is a need for a country-specific study. Moreover, most research is based on small samples, which might not be capable of representing the population's corporate disclosure patterns. Further, in prior studies, board structure indicators are limited to board size, board independence and CEO duality. None of the research studies on intellectual capital has attempted to examine other board structure characteristics such as board gender diversity.

In addition, there is limited research on the analysis of the value relevance of qualitative intellectual capital disclosure. Value relevance approach is frequently adopted to test the disclosure quality. However, much of the value relevance literature focuses on testing the value relevance of items that are subject to quantitative measurement under the accounting standards rather than on the information with narrative nature. The results from those studies have limited scope of interpretation and cannot be generalised to the qualitative disclosure.

Finally, while there is a large body of literature on the effect of board structure and ownership concentration on the level of disclosure, very a few researchers examine the impact of those potential factors on the value relevance of intellectual capital disclosure. The next chapter develops hypotheses to address the limitations identified in the literature review.

CHAPTER FOUR

THEORETICAL FRAMEWORK

Based on the literature review in chapter three and with application of agency theory, cost-benefit theory and value relevance approach, this chapter develops hypotheses to examine the effect of board structure, ownership concentration on the level and value relevance of intellectual capital disclosure. First, section 4.1, 4.2 and 4.3 discuss the theoretical framework adopted to identify the link between board structure, ownership concentration and intellectual capital disclosure. Second, the expected impacts of chosen factors on the level and the value relevance of intellectual capital disclosure are discussed in section 4.4 (board structure) and 4.5 (ownership concentration).

4.1 Agency theory

Agency theory provides a framework to establish a linkage between voluntary disclosure and firm-specific characteristics. Within the agency framework, the firm is identified as a legal nexus of contractual relationships among individuals (Jensen and Meckling, 1976). The agency relationship describes the contractual relationship between the principal (shareholder) and the agent (manager) due to the separation of ownership and control. Agency costs arise due to the conflicts of interest between shareholders and managers, and therefore additional costs are incurred for shareholders to monitor managers and align managers' interests with those of shareholders (Fama and Jensen, 1983). In addition, because shareholders are not directly involved in the decision making processes, the information asymmetry existing between principals and agents contributes to moral hazard problems of the

managers. Managers may take advantages of this information gap to distort the information flow and behave opportunistically to pursue personal interests.

Unlike other tangible assets, intellectual capital is highly risky, uncertain and firm-specific (Alves and Martins, 2010). Consequently, agency costs and information asymmetry are expected to be high when intellectual capital is intensively involved in the business process (Alves and Martins, 2010). These problems can be mitigated through the enhanced monitoring systems of the principle (Jensen and Meckling, 1976) and greater disclosure of the activities of the agent (Healy and Palepu, 2001). Within the agency framework, corporate governance literature argues that stronger corporate governance system is effective to diminish agency problems. As stated in Bushman and Smith (2003), the main purposes of corporate governance are to ensure minority shareholders receive reliable information so that they are not expropriated by majority shareholders, and to motivate managers to maximise the value of the firm instead of pursuing individual objectives.

Board structure and ownership concentration are considered as two of the fundamental corporate governance mechanisms that enhance the monitoring of management and contribute to the alignment of managers and investors interests. According to Fama and Jensen (1983), the board of directors acts as the highest internal control mechanism responsible for monitoring the actions of top management. Shleifer and Vishny (1997) suggest that ownership concentration determines the incentives of minority or outside shareholders to monitor the majority or insider shareholders. In addition, ownership concentration determines the interrelationships between minority and majority shareholders, and external shareholders and internal management. At

different ownership concentration levels, the major conflicts of interest may shift from those between shareholders and internal management (Jensen and Meckling, 1976) to those between minority shareholders and majority shareholders (Shleifer and Vishny, 1997; Gomes, 2000).

Other non-governance firm-specific characteristics such as firm size, leverage and other factors may also contribute to the level of agency costs of a firm and influence the effort of a firm on reducing agency problems. Those factors are considered as control variable in this thesis and are discussed in section 5.3.1.

4.2 Cost-benefit theory

Intellectual capital reporting is not subject to accounting regulations. Therefore, the disclosure level of intellectual capital is driven by the incentives of the firm for this disclosure. Cost-benefit theory suggests that managers should not fully disclose information unless the benefits of extra disclosure exceed its cost burdens and proprietary costs (Verrecchia, 1983). Additional disclosure benefits a firm in various ways. For example, Lang and Lundholm (1996) state that increased disclosure lowers the effective interest costs of a company. Other than financial benefits, Pike et al. (2002) argue that more extensive disclosure has positive effects on external reputation and internal esteem that employees will have in the company and its management. However, additional disclosure may result in additional cost burdens and high proprietary costs. First, the cost burdens of additional disclosure are the direct costs associated with the increased staff time to collect and disclose the information. Second, according to Verrecchia (1983), proprietary costs are costs associated with the information that may harm a firm if parties other than investors become aware of

that information. Intellectual capital is knowledge-based equity and may contain “corporate secrets”. By disclosing too much intellectual capital information, a firm may lose its competitive advantages through revealing confidential information to its opponents. Costs and benefits of additional disclosure are determined by other non-governance characteristics such as firm size, profitability and industry types. Section 5.3.2 discusses how those control factors relate to the level of intellectual capital disclosure.

4.3 Value relevance approach

An increased level of disclosure does not guarantee the quality of the disclosure. Corporate disclosure plays an important role in the modern capital markets. Disclosure is an essential tool for management to communicate firm performance to external investors. As stated in Verrecchia (1983) and Healy and Palepu (2001), better quality of disclosure should assist information users to predict future earnings and accurately determine a firm’s market value. In capital market-based accounting research, it is assumed that high quality accounting information is more related to the market value of a firm (e.g. Ball and Brown, 1968). Based on this assumption, the value relevance model developed by Ohlson (1995) and Collins et al. (1997) measures the usefulness of this information to estimate the market value of the firm. It is one of the methods to test the relevance and reliability of the information. Ohlson (1995) and Collins et al. (1997) provide evidence that accounting information such as equity book value and earnings act as proxy for expected future returns.

Prior research suggests that intellectual capital explains the gap between a firm’s market and book values (e.g. Brennan and Connell, 2000). Moreover, Amir and Lev

(1996) find empirical evidence that financial information under the traditional accounting system is no longer useful to investors and this information is only informative when combining with non-financial intangible information. Therefore, based on the discussion in 4.1 and 4.2, if the corporate governance mechanisms along with other factors affect the level of voluntary disclosure, it will consequently influence the quality of this disclosure.

4.4 Board structure

The board of directors is responsible for ratifying management decision and monitoring management performance (Fama and Jensen, 1983). The board of directors plays a significant role in establishing corporate disclosure policies and overseeing the top managers' compliance with those disclosure policies. It is posited that the effectiveness of the board in monitoring management is determined by its size, independence and gender diversity.

4.4.1 Board size

Board size is an important proxy for the effectiveness of monitoring function of the board. Larger board has greater diversity of perspectives and skills, which make the board more effective and efficient in decision makings (e.g. Pfeffer, 1972). Belkhir (2009) provides empirical evidence that boards contribute to better performance of the firm.

It is argued that board size plays a key role in influencing corporate disclosure decisions. Abeysekera (2010) indicates that larger boards can supplement the skill deficits of directors at an individual level and ensure long-term future earnings of a

firm through greater voluntary disclosure. Consistently, Hidalgo et al. (2011) find a significant positive relationship between board size and the level of intellectual capital disclosure of the Mexican listed companies. Combining with the results from previous research, they also conclude that there is no difference in this relationship between developed and developing countries. Moreover, this relationship is specifically relevant to human capital disclosure because larger boards are expected to contain more competent and knowledgeable personnel. Finally, firms with larger boards are more incentive to voluntarily disclose the skills of each board member to enhance shareholder confidence in the capital market.

In terms of value relevance, large board improve the quality of reported information through the enhanced monitoring function of the board (Abeysekera, 2010), better knowledge and skills (Pfeffer, 1972) and increased level of disclosure (e.g. Abeysekera, 2010; Hidalgo et al., 2011). These theoretical arguments are confirmed by the empirical evidence in Bradbury et al. (2006) that board size is positively related to the quality of information. In addition, large board is more likely to disclose information more frequently. Karamanou and Vafeas (2005) find a positive relationship between the frequency of updates of management earnings forecasts and board size. From investors' perspective, more frequently updated information is more useful to estimate the firm's market value. In contrast to the above studies, there are some empirical evidence shows that large boards negatively relate to the firm's market value (e.g. Yermack, 1996; Vafeas, 2000). The reason may be that larger boards have less effective communication and therefore have less decision making capabilities (Vafeas, 2000). Following Pfeffer (1972), Bradbury et al. (2006) and Karamanou and

Vafeas (2005), this thesis expects a positive impact of a larger board on the value relevance of intellectual capital disclosure.

H1a: The level of intellectual capital disclosure is higher for firms with a larger board.

H1b: The value relevance of intellectual capital disclosure is higher for firms with a larger board.

4.4.2 Board independence

Board structure determines the quality of the monitoring function of the board. However, Fama and Jensen (1983) argue that the board cannot effectively monitor the actions of top managers if the insiders (top managers) dominate the board. They suggest that outside directors are more efficient in the monitoring task and less possible to collude with top managers. Therefore, the ability of the board to reduce agency costs is enhanced by the inclusion of the outside directors. In line with Fama and Jensen (1983), Haniffa and Cooke (2005) state that more non-executive directors provide wider expertise, prestige and contracts, which in turn positively influence the quality of the function of the board. Also, outside directors have more incentives to improve their performance to develop their reputations as qualified outside directors (Haniffa and Cooke, 2005). Consistent with those theoretical arguments, the recommendation of the appointment of independent directors is included in some countries' best corporate governance practices (e.g. New Zealand).

Various conclusions are drawn from prior corporate disclosure studies. Chen and Jaggi (2000) find that the appointment of non-executive directors is associated with

additional corporate disclosure. Consistently, Arcay and Vazquez (2005) provide empirical evidence for the positive relationship between the inclusion of outside directors and voluntary disclosure. However, Ho and Wong (2001) do not find significant relationship between board independence and the level of voluntary disclosure. Further, a number of studies document a negative relationship between the percentage of outside directors and voluntary disclosure (e.g. Eng and Mak, 2003). One possible reason could be that the appointment of outside directors only fill the additional position rather than acting as substitutes for existing directors (Cheng and Courtnay, 2006).

With regard to intellectual capital disclosure studies, and consistent with voluntary disclosure research, Li et al. (2008) observe that intellectual capital disclosure is significantly associated with board independence. On the other hand, Hidalgo et al. (2011) find that board independence is not significantly related to the level of voluntary disclosure. They suggest that the legal environment may augment or diminish this relationship.

The positive impact of the inclusion of outside directors extends to the quality of financial information. Beasley (1996) confirms the importance of outside directors on the board in reducing financial statement fraud by examining the board independence and financial statement fraud for 150 listed firms in the U.S. The study finds that no-fraud firms had a significantly higher percentage of outside directors than that of fraud firms. Beasley (1996) defines outside directors as all non-employee directors. The study adds that the empirical tests are not sensitive to the definition of outside directors used. Consistent with Beasley (1996), Dechow et al. (1996) find that insider-

dominated boards are more likely to associate with the violations of GAAP and the overstatement of reported earnings. Following prior literature, Bushman et al. (2004), Vafeas (2005) and Karamanou and Vafeas (2005) provide further empirical evidence that information quality increases with the proportion of independent directors. These findings imply that valuation based on the information provided by the firm with higher proportion of independent directors will be less biased because there are less violations and frauds. As such, information from those firms might be more value relevant to investors.

Following the argument made by Fama and Jensen (1983) and other prior research, this study hypothesises that:

H2a: The level of intellectual capital disclosure is higher for firms with a higher proportion of independent directors.

H2b: The value relevance of intellectual capital disclosure is higher for firms with a higher proportion of independent directors.

4.4.3 Board gender diversity

As a result of growing equality between genders, gender composition of the board has become one of the most significant issues in finance and economic literature. Extant research provides theoretical argument that the inclusion of women on the board benefits the board performance in various ways (e.g. Cox and Blake, 1991; Robinson and Dechant, 1997): women provide different perspectives to board decision making, better understanding of the marketplace, increased creativity and innovation, improvement of problem-solving skills and organisational flexibilities.

Much of literature believes that gender diversity has a positive impact on a firm's long-term and short-term financial values. However, mixed results are observed in empirical studies. Shrader et al. (1997) find a positive relationship between the proportion of female managers and financial performance of the firm. Following Shrader et al (1997), Carter et al. (2003) document that gender diversity is positively associated with the firm value measuring by Tobin's Q. On the other hand, Farrell and Hersch (2005) also observe a positive relationship between Return on Assets (ROA) and gender diversity. However, they argue that adding women on the board does not result in value creation. Instead, the result is due to women's self-selections for better performed firms. In contrast to prior studies, Adams and Ferreira (2009) find a negative relationship between gender diversity and firm performance.

As discussed earlier, monitoring function of the board has a direct impact on the level and quality of corporate disclosure. It is argued that board with higher proportion of female directors may be more effective in relating its monitoring function. Carter et al. (2003, p. 37) state that gender diversity improves board independence because "people with a different gender, ethnicity, or cultural background might ask questions that would not come from directors with more traditional backgrounds". Similarly, Adams and Ferreira (2009) provide some evidence that the inclusion of women on board improves monitoring function of the board. The study shows that female directors generally have better attendance for board meetings than male directors and are more likely to join monitoring committees. In addition, male directors appear to have better attendance with higher proportion of women on the board. Board meeting frequency is considered as a proxy for the attempt that directors made to monitor the

management (Vafeas, 1999). Therefore, it can be concluded that women behave differently in terms of the attempt made to fulfil monitoring duties of the board.

With regard to the relationship between gender diversity and the quality of financial information, Gul et al. (2011) argue that board gender diversity enhances the quality of board discussions and improves the ability of the board to provide better quality of corporate disclosure. Further, this study provides timely evidence that board gender diversity is positively related to the stock price informativeness. Similarly, following the argument made in Adams and Ferreira (2009) that female directors provide better oversight over managers, Srinidhi et al. (2011) document that a more diverse board improves the quality of earnings. Following both theoretical arguments and empirical evidence from prior research, it leads to the following hypotheses:

H3a: The level of intellectual capital disclosure is higher for firms with a higher proportion of female directors on the board.

H3b: The value relevance of intellectual capital disclosure is higher for firms with a higher proportion of female directors on the board.

4.5 Ownership concentration

Ownership concentration has a significant impact on the demand and supply of corporate disclosure. There are two arguments relating to the effects of ownership concentration: entrenchment effect and alignment effect. The entrenchment effect refers to the argument that controlling shareholders determine how profits are distributed among shareholders, and the interests of minority shareholders may be expropriated by the controlling shareholders (Fama and Jensen, 1983; Shleifer and

Vishny, 1997). In contrast, the alignment effect is based on the argument that controlling shareholders are willing to build a reputation for not expropriating minority shareholders (Gomes, 2000). The effect of ownership concentration on corporate disclosure is the combination of entrenchment and alignment effects. This may cause the non-linear relationship between ownership concentration and the level and quality of corporate disclosure.

The traditional agency problem deals with the conflict between management and shareholders. However, Gomes (2000) argue that in the legal system that does not provide protection for minority shareholders, agency problem may also arise between controlling shareholders and minority shareholders. As discussed in chapter two, New Zealand law does not offer strong minority shareholders protections. As a result, at different levels of ownership concentration, the conflicts of interest may shift from those between management and shareholders to those between the majority shareholders and minority shareholders for New Zealand listed companies.

At the low level of ownership concentration, both the entrenchment effect and alignment effect are weak. External share owners, in this situation, have no influence on corporate disclosure decision makings and therefore the company has no pressure to disclose additional information. As the ownership concentration level increases, especially when a company's shares are owned by a few controlling shareholders as well as a large number of minority shareholders, the level and the quality of corporate disclosure improves as a result of the increased power of external shareholders and alignment effect. According to Jensen and Meckling (1976) and Fama and Jensen (1983), the separation ownership and control create incentives of powerful outside

shareholders monitoring the internal managers' behaviour. Hence, investors demand higher levels of information to monitor the management as there is a lack of first-hand access to information (Gelb, 2000; Arcay and Vazquez, 2005). An increased disclosure level reduces information asymmetry and provides higher protection of shareholders' interests and thus reduces the conflicts between contracting parties. Alternatively, when controlling shareholders are internal owners (managerial ownership), there is an increasing in the incentives for managers to develop a reputation for treating minority shareholders well (Gomes, 2000; Fan and Wong, 2002). Gomes (2000) find empirical evidence that the reputation effect is significant whenever the moral hazard problem is significant. When ownership concentration level continues to increase, it is expected that the level of disclosure might decrease. Higher ownership level gives shareholders sufficient power to obtain company's information so that there is a decrease in the demand of corporate disclosure (Makhija and Patton, 2004). The alignment effect might be mitigated by the entrenchment effect when a company's shares are owned by a few blockholders. For example, in the extreme case when the manager owns all company's share, there will be no demand for a level of disclosure and a reputation effect. That company will have no motivation to disclosure additional information and be more likely to limit the disclosure to the mandatory requirement level.

The empirical evidence on the relation between ownership concentration and the level of disclosure is mixed. Chau and Gray (2002), Lakhali (2005) and others provide empirical evidence of a positive (negative) association between voluntary disclosures and ownership diffusion (concentration). Numbers of study examine the impact of ownership concentration on intellectual capital disclosure (e.g. Li et al., 2008; Hidalgo

et al., 2011; Whiting and Woodcock, 2011). Li et al. (2008) find that share ownership concentration shows significant negative associations with intellectual capital disclosed in annual reports of the U.K. listed companies. In contrast, Hidalgo et al. (2011) do not find significant relationship between ownership concentration and intellectual capital disclosure within the Mexican context. In line with Hidalgo et al. (2011), Whiting and Woodcock (2011) find that intellectual capital disclosure of Australian firms is not associated with ownership concentration.

In terms of the relation between ownership concentration and the quality of information, again, prior research provides mixed evidence with respect to the association between these two variables. Fan and Wong (2002) find that concentrated ownership is associated with low earnings informativeness in the East Asian context. Wang (2006), on the other hand, document that highly concentrated ownership of firms is significantly associated with better earnings quality in the U.S. These mixed results might be caused by the different combined effects of entrenchment and alignment effects at different levels of ownership concentration.

There are limited studies investigating the non-linear relationship between ownership concentration and voluntary disclosure. Makhija and Patton (2004) examine the impact of ownership concentration on voluntary disclosure in newly privatised Czech firms. They observe a positive relationship at a low level of ownership concentration but a negative relationship at a high level. Consistent with Makhija and Patton (2004), Jiang and Habib (2009) confirm the non-linear pattern of relationship between ownership concentration and voluntary disclosure of New Zealand listed companies.

According to theoretical arguments and empirical studies, the hypotheses are written as follows:

H4a: The level of intellectual capital disclosure is positively (negatively) related to ownership concentration at a lower (higher) level of ownership concentration.

H4b: The value relevance of intellectual capital disclosure is positively (negatively) related to ownership concentration at a lower (higher) level of ownership concentration

4.6 Summary

Using prior literature along with agency theory, cost-benefit theory and value relevance approach, this chapter develops hypotheses to examine the relationship between board structure, ownership concentration and intellectual capital disclosure. The next chapter describes the research methodology that will be used to test the hypotheses discussed in this chapter.

CHAPTER FIVE

METHODOLOGY

This chapter describes the methodology used to test the hypotheses developed in chapter four. Section 5.1 explains the sample selection process and study period. Section 5.2 and 5.3 describe the development of research instruments and models. An outline of the measures for relevant variables in the research models is provided in section 5.4. Finally, section 5.5 discusses how hypotheses will be tested using the developed models.

5.1 Sample selection and study period

This thesis examines the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure in annual reports of NZX listed firms. The selected study period is a four-year post-NZ IFRSs mandatory adoption period between 1 January 2008 and 31 August 2011. Considering the relatively smaller size of the New Zealand capital market, the initial sample includes annual reports released by all NZX listed firms during the selected period. Equity trusts and funds are excluded because these types of entities have different natures and management systems from ordinary businesses. These entities are not expected to have or disclose any intellectual capital.

Corporate annual reports are used as the main source to determine the level of intellectual capital disclosure in this thesis. Corporate annual report is one of the most widely used and important information. Botosan (1997, p. 329) suggests that annual reports can be “a good proxy for the level of voluntary disclosure provided by a firm

across all disclosure avenues”. Evidence shows that there is a positive relationship between corporate disclosure levels in annual report and via other media (Lang and Lundholm, 1993). The annual reports and all other relevant information are obtained from NZX database. The primary sample includes:

- All entities listed on the NZX between 1 January 2008 and 31 August 2011;
- Having annual reports available before and on 31 August 2011; and
- Not an equity trusts and funds entity.

After examining all annual reports of the firms from the primary sample, firms that are managed by external companies or with no employees are eliminated because certain types of intellectual capital are not relevant to those firms. The final sample comprises 155 firms covering a total of 519 firm-years. Table 1 illustrates the sample selection process and the size of final sample.

Table 1 Sample selection process

I. Primary sample selection	
All annual reports available during the selected period	562
Excludes annual reports issued by equity trusts and funds entities	(23)
II. Final sample selection	
Excludes annual reports issued by firms with external management team or no employee	(20)
Final sample	519

This thesis focuses on the period 1 January 2008 to 31 August 2011. The starting date 1 January 2008 is chosen because all annual reports released on and after this date are based on NZ IFRSs. Annual reports released before this date can be either based on NZ IFRSs or the old GAAP. In order to obtain sufficient data for analysing, annual

reports published on 31 August 2011 are the most recent annual reports can be obtained.

5.2 Development of the research instrument

5.2.1 Disclosure index

As discussed earlier, intellectual capital disclosure is not mandatorily required by accounting standards. Therefore, this thesis examines intellectual capital disclosure that is outside the scope of NZ IFRSs. As discussed previously, NZ IAS 38 is not able to capture all intangible assets that contribute to the future economic benefits. Entity can only recognise an intangible asset when it can be measured accurately in quantitative terms. However, figure-only information has the lowest level of value added to the information (Sveiby, 1997). Text and analysis are more informative to the information users. Due to the lack of mandatory requirement, a firm will only disclose the information that will benefit the firm. Therefore, voluntary disclosure is also an important source to understand how firms benefits from their resources.

The level of intellectual capital is the dependent variable in the model to test the first research question and one of the independent variables in the model to test the second question. This thesis adopts the content analysis method to examine intellectual capital information disclosed in corporate annual reports. A self-constructed disclosure index is used to measure the level of intellectual capital disclosure. The disclosure index is one of the most common research instruments to quantify the extent of disclosure in annual reports, especially for voluntary narrative disclosure (e.g. Botosan, 1997; Lev, 2001 and others). However, use of disclosure index is subject to several limitations.

According to Marston and Shrivess (1991), one of the limitations is that the quantity of disclosure is not necessarily a proxy for the quality of information. To solve this problem, this thesis conducts separate tests for the quantity (level) and quality (value relevance) of the information, respectively. Similar to other studies employing indices, this thesis adopts an item-based approach, where a score of 1 is given for each item disclosed and a score of 0 is given if the item is not disclosed. This thesis does not weight any item in the disclosure index, which means that all the information in the list is of equal importance. The use of a non-weighted index is able to avoid subjectivity. Furthermore, evidence shows that use of both weighted and non-weighted indices reach the same results (Chow and Wong-Boren, 1987).

The procedures of constructing the disclosure index include three steps: (1) reviewing prior disclosure literature and constructing a preliminary checklist; (2) comparing preliminary checklist items with New Zealand financial reporting regulations (e.g. NZ IAS 38), and excluding the items that are mandatorily required; (3) pilot-testing on a sample of 15 annual reports to refine the index and exclude the irrelevant items.

5.2.2 Selection of categories and items

Categories and items selections determine the quality of a disclosure index. In order to develop a well-designed disclosure index, a review of several intellectual capital disclosure indices developed in prior studies is conducted. Various frameworks have been developed and adopted by recent studies. For example, voluntary studies such as Hashim and Saleh (2007) and Nekhili et al. (2010) apply Botosan's (1997) framework (which based on American Institute of Certified Public Accountants report), whereas Kang and Gray (2011) design their index of R&D voluntary disclosure based on Lev's

(2001) value chain scoreboard framework. Among those studies, even though the indices are developed based on the same framework, the size, category structure and scoring system of the index varies from one study to another. For example, Jones (2007) adopts Botosan's (1997) framework to develop the R&D voluntary disclosure index. He uses a checklist of 47 items allotting 1 or 2 points for each item. On the other hand, Hashim and Saleh (2007), while adopting the same framework, use a total of 60 items with 1, 1.5, 2 or 3 points for each item. Nekhili et al.'s (2010) checklist comprises of 33 items, and each item is given equal weight.

As there is no generally accepted definition and classification for intellectual capital, intellectual capital disclosure indices show less similarity to each other. Unlike general voluntary disclosures, there is no basic framework that can be broadly applied in voluntary intellectual capital disclosure studies. Studies use different categories to distinguish different types of intellectual capital. The category selections are described in the Table 2 below (sub-categories excluded).

Table 2 Categories in intellectual capital disclosure indices

Reference	Categories (number of items)
Guthrie and Petty (2000)	Internal structure (11), External structure (9), Employee competence (6)
Bontis (2003)	No specific category (39)
Gandia (2003) ⁸	Innovation index (9), Human resources index (9), Customers index (6), Networking index (5)
Bukh et al. (2005)	Employees (27), Customers (14), IT (5), Processes (8), Research and development (9), Strategic statement (15)
Li et al. (2008)	Human capital (22), Structural capital (18), Relational capital (21)
Singh and Kansalv (2011)	Internal: organisational (structural) capital (3), Internal infrastructure assets (6), External: customer (relational) capital (9), Employee competence: human capital (24)
Nurunnabi et al.(2011)	Internal (structural) capital (11), External (relational) capital (19), Human (employee) capital (17)

After reviewing prior literature, this thesis adopts Sveiby's (1997) classification and classifies intellectual capital into three categories: employee competence, external structural and internal structural (or human capital, relational capital and structural capital). These three components are the most frequently adopted components in prior study.

The items selected for the disclosure index is drawn from a variety of definitions and indices developed in prior studies. In order to capture most of intellectual capital, this thesis develops a detailed checklist which covers most items used in prior literature that are considered to be relevant in the New Zealand context. In addition, the checklist includes the items that are recently added to the scope of intellectual capital.

⁸ The listed categories are within one of the sub-indices of Gandia's (2003) index – Content Internet Index. Other sub-indices are not relevant.

Claver-Corters et al. (2007) suggest that environmental capital has a similar nature as intellectual capital, therefore should be recognised as intellectual capital. By extending Chaver-Corters et al. (2007), this thesis also includes social capital in the disclosure index. In accordance with theoretical arguments, empirical studies, the New Zealand context and a pilot-testing of 15 sample annual reports, the final disclosure index consists of 3 categories with 54 items. The descriptions and scoring methods are provided in Appendix A.

5.2.3 Intellectual capital components and business success

According to Edvinsson and Malone (1997), intellectual capital reporting has little value for information users unless it is linked to the strategy of the firm. Intellectual capital disclosure does not only reveal the disclosure behaviour regarding this information, but also reflects a company's strategies and activities to improve its market competitiveness, maintain its value and long-term growth. Therefore, the usefulness of disclosed information to understand the business success strategies of a firm is also considered in the disclosure index development process. The section below explains how intellectual capital components relate to the organisational success.

Human capital

Edvinsson and Malone (1997) define human capital as individual abilities, knowledge, know-how, talent, and experience of both employees and managers of a firm. Human capital theory by Becker (1964) suggests that human resources are the most important asset of an organisation. Therefore, education and training raise the productivity of works through improved knowledge and skills (Becker, 1994). Similarly, Sveiby

(1997, p.86) argues that people are the only true agents in business. He states that human capital is “the place where all the ladders start...” People create external and internal structures to express themselves to the market. As a result, all assets and structures are the result of human actions. Consistent with the prior literature, Bontis (1999) indicates that human capital is important as it is the source of strategic innovation for organisations.

Employee competence is the most important resource owned by an organisation because organisations cannot function without people. Even though employee competence cannot be disclosed as intangible assets under the current standards, the majority of intangible assets studies consider human capital as an important attribute to a firm’s value. In an empirical study, Maditinos et al. (2011) find that only human resources are the most significant factors of economic success (financial gains) after examining 96 Greek listed companies.

Relational capital (External structural capital)

Relational capital refers to the relationships of a firm with its customers and suppliers as well as the knowledge embedded in those relationships (Bontis et al., 2000). In addition, Sveiby (1997) suggests that market orientation capital such as brand names, trademarks, and the company’s reputation or image should be also categorised as external structural capital. The importance of relational capital as a value driver is documented in numbers of empirical studies. Amir and Lev (1996) state that market penetration or the potential number of customers is the fundamental determinants of the value of firms. Similarly, Chauvin and Hirschey (1993) find that advertising investments have large, positive and consistent influence on the value of the company.

Structural capital (Internal structural capital)

The internal structure is the flow of knowledge within an organisation (Sveiby, 1997). It includes patents, concepts, models, computers, administrative systems and organisational culture or spirit, which are created or acquired by an organisation.

Structural capital is another important input of organisation's future growth in the new knowledge-based economy. Freeman's (1982) innovation theory and Aghion and Howitt's (1998) endogenous growth theory highlight that investment in R&D and accumulation of knowledge are the fundamental determinants of economic growth. Innovation theory by Freeman (1982) emphasises the role of new product or new equipment in value creation, whereas Aghion and Howitt (1998) indicate that the long-term economic growth is determined by the creation of new technological knowledge. According to those theories, the monopoly power is granted through producing new technologies and other organisational-specific knowledge (Sveiby, 1997).

5.3 Development of the research models

5.3.1 The level of intellectual capital disclosure

As discussed in chapter four, three board structure characteristics (board size, board independence and board gender diversity) and ownership concentration are predicted to be related to the level of intellectual capital disclosure. This thesis expects a non-linear relationship between ownership concentration and the level of disclosure. In this respect, a quadratic variable of the ownership concentration has been included in the

model. The relationship of board structure, ownership concentration and the level of intellectual capital disclosure is expressed as follows:

$$IC = \beta_0 + \beta_1 Brdsize + \beta_2 Brdindp + \beta_3 Brdfemale + \beta_4 OC + \beta_5 OC^2 + \varepsilon$$

where IC is the level of voluntary disclosure of intellectual capital, Brdsize, Brdindp and Brdfemale are board size, board independence, board gender diversity, respectively, OC is ownership concentration.

Besides board structure and ownership concentration, other firm-specific characteristics are also expected to have significant impacts on the level of intellectual capital disclosure. Those control variables are incorporated in the model.

Firm size

Firm size is the most frequently used control variable in disclosure literature (e.g. Ho and Wong, 2001; Eng and Mak, 2003; Li et al., 2008). A Number of theories argue that firm size is positively associated with the level of disclosure. Within the agency framework, larger firms are expected have higher agency costs and therefore there is a higher demand of corporate disclosure to reduce the information asymmetry between managers and shareholders (Jensen and Meckling, 1976). Following this argument, Hashim and Saleh (2007) provide empirical evidence that larger firms disclose more annual report information than smaller firms. Stakeholder theory suggests that stakeholders have right to be informed how company's operations affect them. Larger companies may have a wider range of stakeholders with different interests. As different stakeholders demand different perspectives of the companies, this requires company to provide a more comprehensive set of information. Robb et al. (2001)

show that larger firms disclose higher levels of forward-looking and historical non-financial information in their annual reports. Cost-benefit theory also supports positive relationship between firm size and the level of disclosure. Cost burdens of information are relatively smaller to larger firms than that of smaller firms. In accordance with these theoretical arguments, White et al (2010) document that the extent of intellectual capital disclosure is significantly associated with firm size.

On the other hand, risk aversion theory argues that smaller firms are more motivated to disclose more information because shareholders of those firms are more risky and have less access to information (Bukh et al. 2005). However, Bukh et al. (2005) do not find significant correlation between firm size and the extent of disclosure. They suggest that this result is based on limited observations and only reflect to the situation of the companies at the time of the publication of their IPOs prospectuses.

Leverage

Companies with higher level of debt incur higher agency costs (Jensen and Meckling, 1976) and have particular debt covenants liabilities (Dhaliwal et al., 1982). Consequently, managers are motivated to disclose additional information to reduce agency costs (Jensen and Meckling, 1976) or choose particular accounting policies in order to fulfil the obligations in existing debt covenants (Dhaliwal et al. 1982). Mixed results are documented in prior research. Whiting and Woodcock (2011) prove that leverage does have positive effects on intellectual capital disclosures. White et al. (2010) find that leverage is an important factor to affect voluntary intellectual capital disclosure in large Australian biotechnology companies. However, Eng and Mak (2003) find a negative relationship between leverage and level of voluntary disclosure.

Ho and Wong (2001) and Garcia-Meca et al. (2005) do not find any significant relationship between leverage and disclosure.

Profitability

The relationship between profitability and the level of voluntary disclosure varies depending on the nature of information. Singhvi and Desai (1971) argue that managers are motivated to voluntarily disclose more information when performance is good to support the quality of earnings. However, following Verrecchia's (1983) cost-benefit theory, Williams (2001) suggests that firm may reduce its voluntary disclosure when reaches good performance to protect its competitive advantage. Compared to tangible assets, certain intellectual capital such as secret process contains higher level of confidential information that needs to be protected. Incentives of a firm to maintain competitiveness can be a factor to discourage companies to voluntarily disclose this information. Li et al. (2008) document that the level of intellectual capital is positively associated with profitability. Sonnier et al. (2007), however, find a negative relationship between profitability and the level of intellectual capital disclosure. Garcia-Meca et al. (2005) and Hidalgo et al. (2011) do not find significant association between the level of disclosure and profitability.

Listing age

Li et al. (2008) and Whiting and Woodcock (2011) argue that listing age might be negatively related to the corporate disclosure decisions. Both papers indicate that agency theory and risk aversion explain the linkage between listing age and the level of disclosure. For example, shareholders expect higher agency costs for younger companies without an established shareholder base. Therefore, those firms may have

more incentives to disclose higher level information in order to reduce shareholders' risk and lower cost of capital (Haniffa and Cooke, 2002). Li et al. (2008) find moderate evidence to support this relationship. However, Whiting and Woodcock (2011) does not find any significant association between listing age and the level of disclosure.

Industry type

It is argued that industry type is associated with the level of intellectual capital disclosure. According to Verrecchia (1983), the level of voluntary disclosure varies across industries because of different competitive levels within each industry. Firms in highly competitive industries may face potential costs when disclose additional information to their competitors (Verrecchia, 1983). Intellectual capital is usually considered as a key component to determine a firm's competitiveness, especially for intangible-intensive industries. As a result, managers are reluctant to disclosure such information to the public. However, Whiting and Woodcock (2011) argue that intangible-intensive firms have more motivation to disclose higher level of intellectual capital because they rely more on intangibles to create value. Additional disclosure of such information enhances investors' confidence about a firm's future growth potential.

Consistent with these theoretical arguments, much of empirical intellectual capital disclosure literature considers industry type as an important determinant of the level of intellectual capital disclosure (e.g. Garcia-Meca et al., 2005; Bruggen et al., 2009; Kianto et al., 2010; and Whiting and Woodcock, 2011). Bruggen et al. (2009) find the significant impact of the industry type on the level of intellectual capital disclosure.

The study observes that firms from health care and information technology industries disclose significantly more information on intellectual capital than other industries. Kianto et al. (2010) compare intellectual capital disclosure level of product-oriented and service-oriented firms and find that human capital is higher for service-oriented business than for product-oriented firms. Consistent with prior studies, Whiting and Woodcock (2011) find that technology-based or knowledge-intensive industries disclose a higher level of intellectual capital than other industries. However, Garcia-Meca et al. (2005) do not find any evidence that the industry type is associated with the disclosure level.

International listing status

Companies listed on foreign stock exchanges are expected to have a higher level of corporate disclosure because they are subject to more regulations (Cooke, 1989). For example, prior studies suggest that the U.S. listed companies show higher levels of compliance with disclosure requirements (e.g. Glaum and Street, 2003). Singhvi and Desai (1971) find that international listing status is significantly associated with the disclosure level. With regard to intellectual capital literature, Garcia-Meca et al. (2005) expect a significant relationship between international listing status and the level of disclosure, however, they do not find evidence to support their hypothesis.

After controlling for the non-governance firm-specific factors, the full model is expressed as follows:

$$\begin{aligned} \text{RI: } IC = & \beta_0 + \beta_1 Brdsize + \beta_2 Brdindp + \beta_3 Brdfemale + \beta_4 OC + \beta_5 OC^2 + \\ & \beta_6 Firmsize + \beta_7 Lev + \beta_8 Prof + \beta_9 Listage + \beta_{10} Industries + \\ & \beta_{11} Intstatus + \varepsilon \end{aligned}$$

where variables Brdsize, Brdindp, Brdfemale, OC and OC2 are defined as before, Firmsize, Lev, Prof, Listage, Industries and Intstatus represent firm size, leverage, profitability, listing age, industry type and international listing status, respectively. Section 5.4 describes the measurement of those variables.

5.3.2 The value relevance of intellectual capital disclosure

The Collins et al.'s (1997) modified version of the Ohlson's (1995) model (Ohlson-Collins model) has been employed to examine the determinants of the value relevance of intellectual capital. In capital market-based accounting research, this model is one of the most widely adopted models to test the informativeness of accounting information in the capital markets. The model provides a solid framework to explain the gap between firm's book value and market value. The original Ohlson-Collins model constitutes two essential accounting variables (book value of equity and earnings), as well as other information as explanatory factors to explain the differences between book value and market value of a firm.

The regression of original Ohlson-Collins model is written as follows:

$$P_{it} = \gamma_0 + \gamma_1 E_{it} + \gamma_2 BV_{it} + \gamma_3 X + \epsilon$$

where, P_{it} is stock price of firm i . E_{it} is the reported earnings per share of firm i for year t . BV_{it} is the book value per share of firm i at the end of year t . X is other accounting information that may also influence the stock price. The rationale behind this model is that book value of equity and earnings are expected to be unbiased estimators of market value when there is no other factor altering the book value-market value relation.

Knowledge-based equity is considered as a main driving factor for the difference between market and book values. Value relevance of intangibles studies focus on testing the ability of disclosed intangible information (as other information X) to explain firm's market value. Some studies apply the model to quantitative information only such as non-current intangibles (e.g. Abdul-Skukor et al., 2008), software capitalisation (e.g. Aboody and Lev, 1998), R&D (e.g. Cazavan-Jeny and Jeanjean, 2006). However, other studies argue that the usefulness of financial information to predict market value decreases in fast-changing and technology-based industry (e.g. Aimir and Lev, 1996). The increased gap between the book value and market value of firm's equity implies the inadequacy of financial information for firm valuation and indicates the growing need for non-quantitative intellectual capital information (Abhayawansa and Guthrie, 2010). Similarly, as stated in Veltri and Silverstri (2011), non-financial information fits more to the definition of "other information" in Ohlson (1995) that "the events known to the market but not yet embedded in the firm's accounting system" (Veltri and Silverstri, 2011, p.235). Following the prior value relevance of non-financial information studies, this thesis includes intellectual capital as "other information variable" in the model.

$$Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \epsilon$$

Value relevance of accounting information is influenced by many firm-specific factors. Control variables are included to isolate the effect of corporate governance on value relevance of accounting information. Firm specific characteristics such as firm size, leverage, industry type are frequently used as control variables in prior research.

Evidence shows that those factors have significant impacts on the value relevance of accounting information.

Firm size

The first firm-specific control variable is firm size. It has been proved that firm size have a significant impact on investors' focus on the reported accounting information. Collins et al. (1997) state that information is valued differently depending on the firm size. They argue that book value of equity should be more informative for smaller firms because smaller firms are more likely to face financial distress than larger firms. Much of value relevance literature includes firm size as a control for other missing factors and confirm that firm size have some effects on the book – market value relation (e.g. Fan and Wong, 2002; Habib and Azim ,2008). Knowledge-based equity studies such as Chauvin and Hirschey (1993) find that the effectiveness of knowledge-based assets investment is associated with the firm size. As such, the value created through the investment in such assets differs according to the firm size.

Leverage

Higher leverage level is associated with greater degree of risk of holding the firm's equity (e.g. Vafeas, 2000; Fan and Wong, 2002; and Habib and Azim, 2008). Martikainen (1997) argue that an increase in financial leverage raises the risk of managers to manipulate earnings in order to avoid debt covenant violations and consequently reduces the quality of accounting information. Therefore, it can be argued that the value relevance of reporting information for the firm with a higher debt level is lower for investors because of increased financial and default risks. However, Habib and Azim (2008) provide an alternative argument that the lenders

recognise that firm with higher level of debt may have lower quality of accounting information, and therefore additional steps will be taken to ensure there is less opportunity for manager to manipulate the information. As a consequence, the level of leverage should be positively related to the value relevance of information.

Industry type

Intellectual capital is more associated with firm market value for certain industries than others. For example, Chauvin and Hirschey (1993) suggest that the improvement effects of R&D and advertising on product differentiation differ across industries. R&D investment is more related to new product development and differentiation for manufacturers, whereas advertising spending has broad effects on product differentiation and recognition for both manufacturing and non-manufacturing firms. Similarly, Whiting and Woodcock (2011) argue that the profitability of technology-based or knowledge-intensive industries mainly rely on intellectual capital. Therefore it can be argued that intellectual capital investment is more related to the future earning potential for high-tech firms than other firms. As a result, investors may value more on the intellectual capital information disclosed by high-tech firms.

The control variables adjusted model is written as:

R II (1):

$$Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \epsilon$$

To examine the influence of board structure and ownership concentration on the value relevance of intellectual capital disclosure, this thesis employs Habib and Azim's (2008) method. Three board structure characteristics (board size, board independence

and board gender diversity), and ownership concentration are added to RII (1). In addition, similar to the level of disclosure model, a quadratic variable of the ownership concentration is added to test the non-linear relationship between ownership concentration and the value relevance of intellectual capital disclosure [RII (2)]. Further, following Habib and Azim (2008), interaction terms between board structure factors and intellectual capital disclosure, ownership concentration and intellectual capital disclosure are added to model R II (2) to examine the effects of board structure and ownership concentration on the value relevance of intellectual capital [RII (3)].

RII (2):

$$Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \gamma_7 Brdsize + \gamma_8 Brdindp + \gamma_9 Brdfemale + \gamma_{10} OC + \gamma_{11} OC^2 + \epsilon$$

R II (3):

$$Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \gamma_7 Brdsize + \gamma_8 Brdindp + \gamma_9 Brdfemale + \gamma_{10} OC + \gamma_{11} OC^2 + \gamma_{12} Brdsize * IC + \gamma_{13} Brdindp * IC + \gamma_{14} Brdfemale * IC + \gamma_{15} OC * IC + \gamma_{16} OC^2 * IC + \epsilon$$

where Pit, Ei and BVi are defined as before. IC is the level of intellectual capital disclosure. Firmsize, Lev and Industries are firm size, leverage and industry type. Brdsize, Brdindp, Brdfemale, and OC are board size, board independence, board gender diversity, and ownership concentration.

5.4 Measurement of variables

5.4.1 *Measurement of intellectual capital disclosure*

The level of intellectual capital disclosure is calculated as:

$$IC\ score = (\sum_{i=1}^n di)/N$$

where di is number of disclosed items for firm-year i and N is the potential maximum score (i.e. 54 items).

Considering the possibility of overlap among categories (e.g. favourite contracts in relational capital and legal contracts in structural capital), item is only coded once under the most relevant category. Second, the index is aim to capture the level of disclosure and not the frequency of the disclosure, therefore frequently disclosed items or majorly discussed items are only coded once. In other words, the scores do not distinguish how much information a company disclosed regarding one particular item. Further, as mentioned earlier, another purpose of the disclosure design is to describe companies' strategies and activities regarding intellectual capital. Therefore, score 0 means a company fails to disclose certain details of a particular sub-category (e.g. age of directors) or fail to conduct activities to improve its competitiveness in the market (e.g. R&D for new products).

A similar maximum score is applied to all companies. This approach is consistent with most prior intellectual capital studies (e.g. Bukh et al. 2005; Abeysekera, 2010). Some studies use different potential maximum scores for each company as some items might be irrelevant to a particular company or industry (e.g. Cooke, 1989; Hossain et al, 1995). This method considers individual scenario and provides a fair scoring system

for each company. However, it may result that companies with less content disclosed but has high scores when most of the items are considered to be irrelevant to those companies (i.e. small denominator). To overcome the problems that some items might be irrelevant to certain companies, the disclosure index is designed to be applied to all types of companies.

First, instead of including specific intangible items (e.g. brand, special rights) as individual items in the checklist, the disclosure items focus on how many details a firm disclosed regarding a group of individual intellectual capital items with similar features. In other words, the type(s) of intellectual capital appear as sub-categories in the index, and each individual item in the index measures one general aspect of that sub-category (e.g. intellectual property as sub-category and features of IP as individual item of this sub-category).

Second, the creation of sub-categories tends to be suitable for all companies. To achieve this, a wider definition of each sub-category has been used. For example, sub-category research and development includes the R&D of all sorts of company activities such as new strategies, new methods, and new products (see Appendix A for the definition of individual items). So that research and development section is not limited to high-tech companies.

Finally, even though the sub-categories are supposed to apply to all companies, there are certain companies that do not operate in a general understanding ways. Those companies are outside the scope of this thesis. For example, for companies that do not have employees and management team, they are excluded from the sample (see section 5.1).

5.4.2 Measurement of other variables

Table 3 summarises the measurement of all other variables including board structure indicators, ownership concentration, value relevance and control variables. In the level of intellectual capital model, board structure indicators, ownership concentration and control variables are independent variables. In the value relevance model, share price is the dependence variable, whereas all others are independent variables.

Table 3 Measurement of variables

Variables	Definition	Code
<i>Board structure variables:</i>		
Board size	Number of directors serving on the board	Brdsize
Board independence	Proportion of independent directors on the board	Brdindp
Board gender diversity	The percentage of female directors on the board	Brdfemale
<i>Ownership concentration variable:</i>		
Ownership concentration	Herfindahl index*	OC
<i>Value relevance variables:</i>		
Share price	The available price of a share of a company at the nearest date after the release of annual report	P
Earnings per share	Net profit after tax over number of shares issued	E
Book value per share	Book value of equity over number of shares issued	BV
<i>Control variables:</i>		
Firm size	The natural logarithm of total assets	Firmsize
Leverage	The ratio of total debt to the total asset of the firm	Lev
Profitability	Net profit over the book value of equity	Prof
Listing age	Number of years the firm's stock has traded on the stock exchange	Listage
Industry type	Dummy variable, indicator variable equal to 1 if the company is in high-tech industries, and 0 otherwise**	Industries
International listing status	Dummy variable, indicator variable equal to 1 if the company is listed on more than one stock market, and 0 otherwise	Intstatus

Note:

* Ownership concentration

Ownership concentration is measured by the Herfindahl index. The index is calculated by the following formula:

$$\text{Ownership concentration} = \sum_{i=1}^{n=5} \left(\frac{\text{The total number of shares held by shareholder } i}{\text{The total number of shares outstanding}} \right)^2$$

**Industry classification

This thesis uses Global Industry Classification Standard (GICS) as a guideline to classify the sample companies. The GICS divides companies into 10 main sectors and each sector comprises of several industry groups. Because New Zealand capital market is relative small, there are not sufficient numbers of companies for testing in certain sectors or industry groups. As a result, the sample firms are classified as either high-tech or low-tech using their industry groups in GICS. The process is guided by prior literature such as Whiting and Woodcock (2011). Whiting and Woodcock's (2011) modified GISC framework is presented in Appendix B.

5.5 Regression models and hypotheses tests

Final versions of the two models to be used to examine the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure are presented below.

$$\text{RI: } IC = \beta_0 + \beta_1 \text{Brdsiz}e + \beta_2 \text{Brdind}p + \beta_3 \text{Brdfemal}e + \beta_4 OC + \beta_5 OC^2 + \beta_6 \text{Firmsiz}e + \beta_7 \text{Lev} + \beta_8 \text{Prof} + \beta_9 \text{Listag}e + \beta_{10} \text{Industri}es + \beta_{11} \text{Intstat}us + \varepsilon$$

R II (3):

$$\text{Pit} = \gamma_0 + \gamma_1 \text{Ei} + \gamma_2 \text{BVi} + \gamma_3 IC + \gamma_4 \text{Firmsiz}e + \gamma_5 \text{Lev} + \gamma_6 \text{Industri}es + \gamma_7 \text{Brdsiz}e + \gamma_8 \text{Brdind}p + \gamma_9 \text{Brdfemal}e + \gamma_{10} OC + \gamma_{11} OC^2 + \gamma_{12} \text{Brdsiz}e * IC + \gamma_{13} \text{Brdind}p * IC + \gamma_{14} \text{Brdfemal}e * IC + \gamma_{15} OC * IC + \gamma_{16} OC^2 * IC + \epsilon$$

Where

IC	= intellectual capital disclosure index
Brdsiz	= total number of directors on the board
Brdindp	= percentage of independent directors on the board
Brdfemal	= percentage of female directors on the board
OC	= Herfindahl index
OC ²	= The square of Herfindahl index
Firmsiz	= the nature logarithm of total assets
Lev	= the ratio of total debt to the total asset
Prof	= net profit over the book value of equity
Listag	= number of years the firm's stock has traded on the stock exchange
Industri	= 1 for high-tech industries, 0 otherwise
Intstat	= 1 for multi-listing firms, 0 otherwise
Pit	= the price of a share at fiscal year-end or nearest available price
Ei	= net profit after tax per share

RI is developed to examine the level of intellectual capital. The expected impact of board structure indicators and ownership concentration on the level of intellectual

capital disclosure in chapter four (i.e. H1a, H2a H3a and H4a) can be confirmed by the positive significant coefficients of β_1 - β_4 and negative significant coefficient of β_5 .

Hypotheses of the value relevance of intellectual capital H1b, H2b, H3b, and H4b will be tested by model R II (3). Value relevance of information is measured by the explanatory power of the regression (Barth et al., 2000). Therefore, overall, R II (3) is expected to have the highest explanatory power among all regressions [i.e. RII (1), RII (2) and RII (3)]. In addition, according to Habib and Azim (2008), if the board structure factors are positively associated with the intellectual capital disclosure, the coefficients of interaction terms are expected positive and significant (γ_{12} - γ_{14}). Also, if ownership concentration has expected influence on the value relevance of intellectual capital, γ_{15} should be positive and significant and γ_{16} is expected to be negative and significant.

5.6 Summary

This chapter describes the sample selection process and research design. To measure the level of intellectual capital disclosure, a self-constructed disclosure index is developed. In addition, regression models have been developed to test the impact of board structure and ownership concentration on the level and value relevance of intellectual capital. The dependent and independent variables are specified, along with control variables used in the model. Further, how the hypotheses developed in chapter four will be tested is also explained at the end of this chapter. The next chapter reports the descriptive statistics for the level and extent of the intellectual capital disclosure as well as other relevant variables for 519 firm-years. The results of hypotheses testing are also discussed in the next chapter.

CHAPTER SIX

RESULTS

This chapter reports and discusses the descriptive statistics and hypothesis results for the potential influence of three board structure indicators - board size, board independence and board gender diversity and ownership concentration on the level and value relevance of intellectual capital disclosure. Section 6.1 describes the level and extent of intellectual capital disclosure presented by New Zealand listed firms during the period from 2008 to 2011. The descriptive statistics for other variables used in the model are also presented. Section 6.2 reports the hypothesis testing results related to the level of intellectual capital disclosure. Both univariate and multivariate tests are conducted to test these hypotheses. The hypothesis testing results for the value relevance of intellectual capital are presented in section 6.3. Sensitivity analysis results are presented in section 6.4. Finally, section 6.5 discusses key findings and section 6.6 concludes this chapter.

6.1 Descriptive statistics

6.1.1 The level and extent of intellectual capital disclosure

Table 4 reports the descriptive statistics for the intellectual capital disclosure and the disclosure of individual intellectual capital components in accordance with the Sveiby's (1997) classification.

Table 4 Descriptive statistics of the level of intellectual capital (IC) disclosure

Period (Observations)		Intellectual Capital (54 items)	Human Capital* (16 items)	Relational Capital* (21 items)	Structural Capital* (17 items)
<i>Panel A: Descriptive statistics of total IC and individual IC components</i>					
2008-2011 (519)	Mean	0.187	0.230	0.216	0.112
	Std. dev.	0.137	0.196	0.179	0.120
	Min.	0	0	0	0
	Max.	0.593	0.875	0.762	0.529
	Skewness	0.656	0.924	0.646	1.280
	Kurtosis**	2.660	3.390	2.612	4.429
<i>Panel B: total IC and individual IC components by year</i>					
2008 (143)	Mean	0.189	0.240	0.214	0.110
	Min.	0	0	0	0
	Max.	0.593	0.812	0.762	0.529
2009 (138)	Mean	0.187	0.223	0.218	0.113
	Min.	0	0	0	0
	Max.	0.537	0.8125	0.667	0.529
2010 (136)	Mean	0.186	0.224	0.216	0.113
	Min.	0	0	0	0
	Max.	0.481	0.8125	0.714	0.529
2011 (102)	Mean	0.188	0.233	0.216	0.111
	Min.	0	0	0	0
	Max.	0.519	0.875	0.714	0.529
Kruskal-Wallis rank test		Chi-squared	0.052	P-value	0.997
Note:					
* Individual intellectual capital component score is defined as the ratio of individual component items disclosed to the maximum possible number of disclosure items applicable to each component.					
** In Stata programme, a normal distribution will have a kurtosis of 3.00. Some other statistical software, report a value for kurtosis that is the actual value of kurtosis minus three so that a normal distribution would have a value of zero (Acock, 2008).					

Panel A of Table 4 shows that the average IC score for total 519 firm-years is 18.7% with a wide range from maximum score of 59.3% to minimum 0 score. The average IC scores of individual components are 23.0% (human capital), 21.6% (relational capital) and 11.2% (structural capital), respectively. The descriptive statistics results indicate that the average levels of overall intellectual capital as well as individual components disclosure are low. This is not a surprise compared to the results in prior studies (e.g. Bontis, 2003; Hidalgo et al., 2011; Nurunnabi et al., 2011). The reasons

for these low levels of disclosure may be that firms are assumed to disclose voluntary information only when benefits outweigh costs. Additional disclosure imposes cost burdens and high proprietary costs to the firm (Verrecchia, 1983). Second, some firms may choose to disclose additional information on their websites (Gandia, 2003) or via conference calls (Frankel et al., 1999).

For individual component, consistent with Beck (1964) and Sveiby (1997) that human capital is the most influential intellectual capital component, human capital shows the highest average score of 23%. However, inconsistent with the theoretical arguments made by Freeman (1982) and Aghion and Howitt (1998) regarding the importance of structural capital, structural capital has the lowest average score of 11.2%. There are two possible reasons to explain the lowest level of structural capital disclosure. First, most of the structural capital information is considered as “corporate secret”. The competitiveness of the firm might be hindered by the disclosure of too much information as it might reveal the confidential information to the competitors (Verrecchia, 1983). Second, some items in structural capital are subject to the mandatory requirement under NZ IAS 38 (e.g. IP, R&D and IT). They are no longer regarded as voluntary disclosure according to the scoring procedure of this thesis.

In Panel B of Table 4, the number of observations decreases from 143 in 2008 to 102 in 2011. The number of observations in 2011 is far less than other years because some 2011 annual reports have not been released on the cut-off date for data collection. The decreasing trend of the number of observations for 2008 to 2010 (from 143-136) might be explained by a number of corporate collapses during this period. New Zealand entered to economic recession period in early 2008 (Mills, 2010). Consistent

with this trend, the NZX database shows that there are 13 companies delisted in 2008, 11 companies delisted in 2009 and 26 companies delisted in 2010. The average overall IC score decreases yearly from 0.189 in 2008 to the lowest point of 0.186 in 2010, but rises again in 2011 to 0.188. A Kruskal-Wallis rank test shows that there are no significant difference at the 5% level among the level of IC score across the four-year period ($P\text{-value} > 0.05$). It means that macroeconomic factors such as the recession impact do not have influence on the level of intellectual capital disclosure during the examining period. In addition, the average IC score for individual component for each year is very close to the average IC score for individual component for the whole period [e.g. the average IC score of relational capital disclosure for the 4-year period is 0.216, which is similar to the average IC scores of this disclosure in 2008 (0.214), 2009 (0.218), 2010 (0.216) and 2011 (0.216)]. The constant level of intellectual capital disclosure over the four-year period indicates that although there is no regulated framework for intellectual capital reporting across firms, it seems that individual firms may disclose their intellectual capital information systematically across the study period.

Table 5 presents the disclosure frequency of each intellectual capital item among 519 firm-years.

Table 5 Disclosure frequency of individual intellectual capital items

Human capital	Percentage*	Relational capital	Percentage*	Structural capital	Percentage*
1 Photos and ages of directors	58.19%	17 Customer relations	42.20%	38 Lists of intellectual property (IP)	34.87%
2 Backgrounds of directors	70.13%	18 Identification of customer groups	33.53%	39 Features of IP	19.85%
3 Comments on directors	10.79%	19 Customer relation maintenance	37.38%	40 Internal generated IP	1.54%
4 Members of top management	33.72%	20 Acquisition of new customers	6.94%	41 Information technology (IT) system	13.29%
5 Backgrounds of top management	26.01%	21 Customer feedback	11.18%	42 Breakdown of IT costs	4.24%
6 Comments on top management	18.30%	22 Supplier relations	8.09%	43 Online management and trading	10.02%
7 Employee statistics	27.94%	23 Leading suppliers	1.93%	44 Investment in IT	8.67%
8 Changes in employee structure	16.96%	24 Comments on suppliers	1.35%	45 Corporate philosophy	27.75%
9 Comments on employees	24.86%	25 Investors relations	26.01%	46 Information and knowledge sharing	6.94%
10 Training policy	18.11%	26 Partnerships	27.55%	47 Flexibilities and organisation learning	10.60%
11 Training activities	7.13%	27 Comments on partnerships	15.99%	48 General discussion of R&D activities	9.63%
12 Recruitment	6.17%	28 Favourite contracts	29.87%	49 R&D investment	3.66%
13 Health and safety policies	16.96%	29 Comments on favourite contracts	16.96%	50 R&D centres and research partnerships	5.97%
14 Employee motivations	16.96%	30 Other stakeholders	17.15%	51 R&D activities	14.64%
15 Employee communication	7.90%	31 Social policies	26.59%	52 Future prospects of R&D	5.01%
16 Other disclosure	7.71%	32 Environmental policies	28.90%	53 R&D output	9.25%
		33 Market reputation and presence	44.51%	54 Feedback	4.05%
		34 Brand and specification	27.17%		
		35 Awards and achievements	14.64%		
		36 Advertising and promotion	13.49%		
		37 New services	21.77%		

Note: * Percentage is the number of firm-years disclose a particular item divided by total number of firm-years (519). A higher percentage means more firms choose to disclose a particular item in their annual reports. The disclosure frequency means the frequency of an item appeared in all annual report (not the frequency of an item appeared in one annual report).

With regards to the nature and extent of intellectual capital disclosure, one of the most significant findings is that most of intellectual capital information is expressed in narrative rather than numerical terms. This is consistent with the findings from prior research that given the nature of intellectual capital, it is difficult for firms to quantify such information (e.g. Garcia-Meca et al., 2005). As a result of the lack of quantitative measures of intellectual capital, most of intellectual capital disclosure aims at describing rather than valuing a particular item or process. Items 11 (training), 44 (IT), and 49 (R&D) are designed to capture both qualitative and voluntary quantitative intellectual capital information. Scoring in those items means that firms may disclose additional quantitative information besides the mandatory quantitative disclosure. However, Table 5 illustrates that only a few firms disclose voluntary quantitative information regarding training costs (7.13%), IT investment (8.67%) and R&D investment (3.66%).

Consistent with prior research (e.g. Guthrie and Petty, 2000; Bontis, 2003), there is no widely accepted structure for firms to disclose intellectual capital information. Table 5 reveals that there is a large variation in firms' selection of items reported in the annual reports. The percentage of firm-years to disclose a specific item reaches as high as 70.13% (backgrounds of directors) to the lowest level of 1.35% (comments on suppliers).

Within human capital disclosure, item 1 (photos and ages of directors) and 2 (backgrounds of directors) are the two most frequently disclosed items. Around 58% and 70% of the firm-years disclosed these two items in their annual reports. They are also the two most frequently disclosed items among all intellectual capital terms.

These results imply that the quality of directors is the most valuable intellectual capital for New Zealand firms. This finding is consistent with the theoretical argument that the board of directors is the most important decision making device for the firm (e.g. Fama and Jensen, 1983). However, it is possible that the higher level of disclosure regarding the board of directors is influenced by the disclosure requirement relating to the compliance of the Code. The Code sets out that “director should undertake appropriate training to remain current on how to best perform their duties as directors of an issuer” (The Code 2.4). In addition, the Principle 2 of the Principle and Guidelines suggest that the directors “should be a balance of independence, skills, knowledge, experience, and perspectives among directors so that the board works effectively”. These encourage firms to have and disclose qualified directors. Finally, other human capital items such as item 4 (members of top management), 7 (employee statistics) and 5 (backgrounds of top management) are also highly frequently mentioned terms.

With regard to relational capital, market reputation and presence (item 33) is the most frequently disclosed item (44.51%), followed by customer relations (item 17, 42.2%), customer relation maintenance (item 19, 37.38%), customer groups (item 18, 33.53%) and favourite contracts (item 28, 29.87%). These results imply that, for relational capital, marketing reputation and customer-related capital are two of the fundamental factors determining organisational success for New Zealand firms. On the other hand, there are a small number of firms commenting their suppliers on the annual reports (item 24). This item is the least reported item among all intellectual capital terms (1.35%).

The frequency of structural capital items is relatively low compared to that within the other two categories. Consistent with Guthrie and Petty (2000) and Bontis (2003), the results show that intellectual property is the most frequently disclosed structural capital item. Further, most of the items within structural capital category can only be found in less than 10% of the corporate annual reports (10 out of 17 items). As discussed above, high proprietary costs and the overlap with mandatory requirements of NZ IAS 38 are the two possible explanations for the low disclosure level of structural capital.

6.1.2 Descriptive statistics of other variables

In Table 6, Panel A reports the descriptive statistics of board structure and ownership concentration variables. The table shows that board size of the sample ranges from 3 to 12, with an average of 6 directors and standard deviation of 1.767. As mentioned earlier, the NZX Listing Rule 3.3.1 (a) requires that the minimum number of directors shall be three for each issuer. The compliance rate of New Zealand listed firms for the Rule 3.3.1 (a) is 100%.

In terms of board independence, the table shows that the average percentage of independent directors on the board is 0.606, with minimum 0% and maximum 100% independence rate. Not all listed firms comply with the mandatory requirement regarding independent directors. First, the Rule 10.5.5 (j) requires issuers to include a statement as to which of its directors are independent directors and which of them are not in their annual reports. However, the results show that 64 out of 519 (12.33%) firm-years did not comply with this rule. Second, among 455 firm-years that have complied with 10.5.5 (j), 8 (see Note* in Table 6) out of 455 did not meet minimum

number of two independent directors or three if there are eight or more directors (or one –third of the total number of directors, whichever is the greater) under 3.3.1 (c).

Table 6 Descriptive statistics of other variables

Panel A : Board structure and ownership concentration variables						
	Obs.	Mean	Std. dev.	Median	Min	Max
Brdsize	519	5.830	1.767	6	3	12
Brdindp*	455	0.606	0.203	0.6	0	1
Brdfemale**	502	0.073	0.120	0	0	0.5
OC	519	0.166	0.178	0.093	0.000	0.846
Panel B : Value relevance variables						
	Obs.	Mean	Std. dev.	Median	Min	Max
P	512	1.936	3.468	0.945	0.001	32
E	519	0.076	0.368	0.036	-1.792	3.682
BV	519	1.456	2.119	0.913	-1.400	16.873
Panel C (I) : Control variables						
	Obs.	Mean	Std. dev.	Median	Min	Max
Firm size	519	18.660	2.608	18.821	10.127	27.379
Leverage	519	0.888	7.299	0.474	0.002	163.12
Profitability	519	-0.078	7.908	0.054	-103.218	118.121
Listing age	519	15.266	13.922	11	0	107
Panel C (II) : Control variables (dummy variables)						
	Group		Obs.	Percentage		
Industry type	Low Tech		256	49.33%		
	High Tech		263	50.67%		
International listing status	Single Market		429	82.66%		
	Multi-listing		90	17.34%		
Note:						
*2 firm-years clearly indicated that the company had no independent director in their annual reports. 3 firm-years disclosed that the firm only had 1 independent director. 3 firm-years had less than 3 independent directors while there were 8 (or more) directors on the board. 64 (519 minus 455) firm-years did not report any information regarding board independence in their annual reports.						
**66.14% (332 out of 502) of the boards (disclosed gender information) have zero female directors (i.e. around 34% of the boards have at least one female director).						

As shown in Panel A of Table 6, the average percentage of female directors on the board is 7.3%, with minimum 0 and maximum 50%. Around 34% (see Note ** in Table 6) of firm-years have at least one female director on the board. This number is slightly lower than other developed countries [e.g. Australia, average 8.7%, 50% at least one female on the board; Europe, average 8%, 62% at least one female on the

board in Adams and Ferreira (2009)]. However, these higher percentages among Australian and European firms might be due to the fact that the statistics are only based on large companies [Australian Securities Exchange (ASX) 200 and top 200 companies in Europe]. As the evidence showed in Carter et al. (2003), the number of female directors on the board is positively related to the firm size.

The ownership concentration of sample firms varies greatly from 0.000 to 0.846. The mean ownership concentration is 0.166. Slightly different from previous argument that the ownership of New Zealand firms are highly concentrated (e.g. Hossain et al., 2001), the results show evidence of a moderate concentration according to Brown and Warren-Boulton's (1988) concentration benchmark for New Zealand listed firms.

Panel B of Table 6 reports the descriptive statistics of value relevance variables. The mean and median of share price, earnings per share and book value per share are 1.936 (0.945), 0.076 (0.036), and 1.456 (0.913), respectively.

Panel C (I) presents that sample firm-years are widely distributed in terms of firm size, leverage, profitability and listing age. In Panel C (II) of Table 6, the percentages of low-tech and high-tech companies are 49.33% and 50.67%, respectively. 82.66% of sample firm-years are listed on a single capital market and 17.34% of those firm-years are listed on more than one capital markets.

Table 7 reports the correlation coefficients of the board structure and ownership concentration variables. As expected, OC and OC² are strongly related. This is consistent with the findings in Makhija and Patton (2004). In addition, Brdfemale is significantly positively related to Brdsize ($P < 0.01$). This implies that large boards are more likely to have more female directors. These significant correlation coefficients

may cause multicollinearity problem in the multiple regression analysis. However, according to Makhija and Patton (2004), the influence of multicollinearity on the significance of the coefficients is not an issue because multicollinearity biases the t-statistics downward.

Table 7 Correlation analysis of the board structure and ownership concentration variables

Variables	Brdsize (P-value)	Brdindp (P-value)	Brdfemale (P-value)	OC (P-value)	OC ² (P-value)
Brdsize	1 0.015				
Brdindp	(0.664) 0.125	1 0.007			
Brdfemale	(0.001)* -0.076	(0.876) -0.024	1 -0.089		
OC	(0.145) -0.093	(0.542) 0.032	(0.091)** -0.087	1 0.951	
OC ²	(0.131)**	(0.546)	(0.088)	(0.000)*	1

Note:

* and **represent statistical significance at 1% and 10% levels.

See table 3 for the definitions of variables

6.2 The level of intellectual capital disclosure

6.2.1 Univariate tests

A number of univariate tests are conducted to test the relationship between IC score and board structure and ownership concentration variables. The sample is divided into two groups according to the median of each examining factor (except OC test dividing sample into four groups). Both t-test and Mann-Whitney (MW) test are conducted to compare means of IC score of two groups. The results of these univariate tests of the hypotheses relating to the level of intellectual capital are presented in Table 8. According to skewness and kurtosis figures showed in Table 4, the pattern of intellectual capital disclosure does not show a normal distribution. Therefore the

interpretation based on Mann-Whitney test is more accurate. However, Table 8 shows that both tests reach the same results.

Table 8 Results of univariate testing

	Group	Group Threshold	N	Mean	S.D.	Hypotheses	T-test	MW
<i>Dependent variable: IC score</i>								
Brdsiz	0	<6	221	0.135	0.102	0<1	-8.314*	-7.007*
	1	>=6	298	0.226	0.147			
Brdindp	0	<0.6	218	0.170	0.114	0<1	-4.879*	-4.151*
	1	>=0.6	237	0.230	0.148			
Brdfemale	0	=0	331	0.168	0.129	0<1	-5.05*	-5.022*
	1	>0	171	0.234	0.140			
OC low	0	0<OC<0.035**	129	0.144	0.118	0<1	-4.081*	-4.103*
	1	0.035<=OC<0.093**	131	0.208	0.134			
OC high	0	0.093<=OC<0.249**	130	0.199	0.148	0>1	0.010	-0.228
	1	0.249<=OC	129	0.198	0.138			
Note:								
*represents statistical significance at 1% level								
**0.035, 0.093 and 0.249 are 25%, median and 75% percentiles, respectively.								

Consistent with the expectations, both t-test and MW test results show that IC score is significant higher for the firms with a larger board, higher percentage of independent directors, and higher percentage of female directors, respectively. These results provide strong evidence to support H1a, H2a and H3a ($p<0.01$).

It is expected that there is a non-linear relationship between ownership concentration and IC score. The sample is divided into two groups (lower and higher group) according to its median. Each group is further divided into two sub-groups by using 25% percentile for lower group, and 75% percentile for higher group. For the lower group, strong evidence shows that IC score is significantly higher for the firm with higher ownership concentration level. For the higher group, however, the comparison

of mean IC score is not significant between high and low concentration sub-groups (t-test= 0.010 and MW test=-0.228). Therefore, H4a is only partially supported.

6.2.2 Multivariate tests

The multiple regression results are reported in Table 9 (column Model 1). Model 1 produces an adjust R^2 of 0.240. Hypotheses 1a and 2a expect positive associations between board size, board independence and the level of intellectual capital disclosure. Consistent with the univariate tests results and hypotheses, both board size (H1a) and board independence (H2a) are positively and significantly related to IC score, supported by strong evidence ($P < 0.01$). These results indicate that firms with a larger board and a higher level of board independence disclose higher level of intellectual capital disclosure.

Hypothesis 3a predicts that gender diversity is positively related to the level of disclosure. The results show that the coefficient of Brdfemale is positive (0.043), however, the relationship between Brdfemale and IC score is not significant (t-statistics=0.89). The empirical results fail to support H3a. These results may be caused by the low average of female directors on board across New Zealand. In New Zealand, more than 50% of the board do not have female directors on board.

Table 9 Multiple regression analysis on the association between board structure, ownership concentration on the level of intellectual capital

Variables	Expected sign	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics
		<i>Model 1: Total IC score</i>		<i>Model 2 Human capital</i>		<i>Model 3 Relational capital</i>		<i>Model 4 Structural capital</i>	
Intercept	?	-0.298*	-5.45	-0.602*	-7.87	-0.323*	-4.46	0.019	0.35
Brdsize	+	0.018*	3.97	0.015**	2.41	0.026*	4.51	0.009**	2.04
Brdindp	+	0.159*	5.45	0.183*	4.72	0.190*	4.91	0.089*	3.06
Brdfemale	+	0.043	0.89	0.039	0.59	0.096	1.52	-0.020	-0.42
OC	+	0.278*	2.75	0.487*	3.43	0.389*	2.89	-0.055	-0.54
OC ²	-	-0.333**	-2.05	-0.516**	-2.27	-0.478**	-2.22	0.019	0.12
Firmsize	?	0.014*	4.14	0.030*	6.58	0.013*	2.88	-0.001	-0.22
Leverage	+	0.006	0.58	-0.004	-0.28	0.018	1.29	0.001	0.11
Profitability	?	0.000	-0.12	0.000	0.21	-0.000	-0.16	-0.000	-0.39
Listing Age	-	0.000	0.81	0.000	1.25	-0.000	-0.07	0.000	1.04
Industries	+	0.007	0.59	0.033**	2.01	-0.018	-1.15	0.013	1.11
Intstatus	+	-0.004	-0.24	-0.028	-1.21	-0.002	-0.1	0.016	0.98
No. of obs.		450		450		450		450	
R ²		0.259		0.2881		0.236		0.061	
Adj. R ²		0.240		0.270		0.217		0.037	
F-value		13.88		16.11		12.3		2.58	
F sig.		0.000		0.000		0.000		0.003	

Note:

(1)The table reports multiple regression results of the following model (RI):

$$IC = \beta_0 + \beta_1 Brdsize + \beta_2 Brdindp + \beta_3 Brdfemale + \beta_4 OC + \beta_5 OC^2 + \beta_6 Firmsize + \beta_7 Lev + \beta_8 Prof + \beta_9 Listage + \beta_{10} Industries + \beta_{11} Intstatus + \varepsilon$$

Model 2, 3 and 4 replace total IC score with human capital, relational capital and structural capital (see Table 4 for the measurement of individual components)

(2)Table 3 presents the description and measurement of each variable

(3)*, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.

Hypothesis 4a predicts the non-linear relationship between ownership concentration and the level of intellectual capital disclosure. There is strong evidence for this relationship between ownership concentration and IC score. The coefficient of OC is positive and it becomes negative for OC², which means that the higher the ownership concentration, the greater the level of intellectual capital disclosure, but when ownership concentration reaches to a certain level, the level of intellectual capital disclosure reduces as ownership concentration continues to increase. Both coefficients of OC and OC² are significant (P<1% and P<5%, respectively), therefore, H4a are strongly supported.

Among all chosen control variables, only firm size is significantly and positively (coefficient= 0.014; t-statistics= 4.14) related to IC score at the 1% level. Other control variables such as leverage, profitability, listing age, industry type and international listing status are not significantly associated with IC score. These results are in line with those obtained in Ho and Wong (2001) (leverage), Garcia-Meca et al. (2005) (leverage, profitability, industry type and international listing status), Hidalgo et al. (2011) (profitability), Whiting and Woodcock (2011) (listing age). The non-significance of leverage, profitability, and listing age might be caused by the mixed effects of those factors on the level of disclosure. For example, highly leveraged firms are motivated to disclose additional information (Jensen and Meckling, 1976). However, extra disclosure may be costly so that those firms are reluctant to bear the costs of additional disclosure. For profitability, as discussed earlier, although managers are motivated to disclose additional information to support the quality of earnings in high performance year (Singhvi and Desai, 1971), some information may be protected because it contains corporate secret (Williams, 2001). In terms of listing

age, some firms with long history may also be large firms, so that they are more motivated to disclose additional information. As a result, the negative effects of listing age (discussed in section 5.3.1) might be cancelled out by this effect. The non-significance of industry type indicates that the concept and importance of intellectual capital have not been recognised by the majority of New Zealand firms. This is consistent with the conclusion drawn in Guthrie and Petty (2000) and Bontis (2003). Further, the sign of coefficient of international listing status is opposite to the expectation (coefficient= -0.004). The reason for this might be that the expectation that firms that are listed on foreign capital market with higher level of voluntary disclosure only holds when a company is listed on the capital market with tougher rules. In other words, companies that are listed on foreign stock exchanges with less stringent regulation are not expected to disclose more information.

In short, the multiple regression results suggest that consistent with hypotheses H1a, H2a, and H4a, larger firms with a larger board, more independent directors and higher ownership concentration disclose more intellectual capital information, however, once ownership concentration reaches to a high level, it will hinder the level of disclosure. Factors such as gender diversity of boards and control variables including leverage, profitability, listing age, industry type and international listing status have no significant influence on the level of intellectual capital disclosure.

6.2.3 The level of intellectual capital disclosure: individual components analysis

Further tests are conducted to examine the impact of board structure factors and ownership concentration on individual intellectual capital components. The results are presented in Table 9 (Models 2 to 4).

First of all, Model 2 (human capital) produces the highest adjust R^2 (0.270), whereas Model 4 (structural capital) has the lowest adjust R^2 (0.037). These results indicate that board structure and ownership concentration have stronger association with human capital disclosure than with other types of intellectual capital disclosure. As mentioned earlier, some factors cause difficulties to capture the full information of a firm's structural capital: (1) some items in structural capital are subject to the mandatory requirement of NZ IAS 38; and (2) there is a need to protect firm-specific knowledge to maintain a firm's competitiveness. These may explain the lowest adjusted R^2 of structural capital model (Model 4).

Second, the coefficients of both Brdsize and Brdindp are positive and significant in all models. These results confirm that board size and independence are fundamental factors determining a firm's disclosure level and strategies relating the overall intellectual capital as well as its individual components. In addition, the coefficients of board size, independence are the highest in relational capital model (Model 3). The results indicate that larger boards and the inclusion of more independent directors have more business connections with external partners and markets. Moreover, Model 2 (human capital) reveal that board independence also plays an important role on human capital disclosure and strategy (coefficient= 0.183, $p < 0.01$). It implies that

firms with more independent board might have better recognition of the importance of human capital, engage more activities to improve employee competence. In other words, combining with the items in the disclosure index, those firms provide better training opportunities, health and safety policies and communication system. Furthermore, the results show that board gender diversity does not have any significant influence on any types of intellectual capital.

Third, the sign and significance for the coefficients of ownership concentration, firm size and other control variables are similar and consistent with the expectations in all models except for Model 4 (structural capital). Model 2 (human capital) has the largest coefficients of OC, and Firm size (0.487 and 0.030), which means that higher OC and larger firms are more likely to disclose more human capital than other types of intellectual capital. However, when OC reaches a high level, it has more negative impacts on the level of human capital disclosure (and the strategies relating to human capital).

6.3 The value relevance of intellectual capital disclosure

6.3.1 Board structure, ownership concentration and the value relevance of intellectual capital disclosure

Table 10 presents the multiple regression results for three value relevance models: model without board structure and ownership concentration factors [RII (1), Model 5], model without interaction terms [RII (2), Model 6], and the full model [RII (3), Model 7]. As stated in Barth et al. (2007), higher explanatory power of the regression can be interpreted as evidence of more value relevance. As expected, the full model

(Model 7) produces the highest adjust R^2 among all three models [Model 5 (0.806), Model 6 (0.819) and Model 7 (0.821)]. It indicates that the inclusion of board and ownership concentration factors and interaction terms improves the explanatory power of reported information on the market value of a firm.

In addition, consistent with prior value relevance literature (e.g. Collins et al, 1997 and others), both earnings and book value of equity are positively and significantly related to share price (in all three models). These results confirm that those two accounting variables are fundamental factors to explain a firm's market value for the New Zealand context. Further, Model 7 (full model) shows that board gender diversity has a significant positive impact on the firm market value (coefficient= 2.22, $p < 0.05$). This is consistent with Carter et al. (2003), who find the positive influence of board gender diversity on a firm's market value. Moreover, the regression results confirm that control variables such as firm size, leverage and industry type are significantly and positively associated with a firm's market value.

Table 10 Board structure, ownership concentration and the value relevance of intellectual capital disclosure

Variables	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics
	<i>Model 5: Full model without board structure and OC factors[RII(1)]</i>		<i>Model 6 : Full model without interaction terms[RII(2)]</i>		<i>Model 7 : Full model[RII(3)]</i>	
Intercept	-2.466*	-4.04	-3.192*	-4.11	-1.618	-1.61
E	1.714*	7.04	1.697*	6.47	1.717*	6.52
BV	1.144*	24.21	1.157*	23.06	1.154*	23.09
IC	1.567*	2.79	1.068***	1.66	-7.242**	-2.25
Firmsize	0.106*	3.00	0.076	1.61	0.090***	1.91
Lev	0.140	1.49	0.285**	2.05	0.289**	2.09
Industries	0.623*	4.57	0.582*	3.76	0.498*	3.18
Brdsize			0.076	1.28	-0.131	-1.36
Brdindp			0.975**	2.40	-0.090	-0.12
Brdfemale			1.690*	2.62	2.22**	2.02
OC			1.537	1.13	2.283	0.93
OC ²			-3.192	-1.47	-4.493	-1.09
Brdsize*IC					0.925*	2.74
Brdindp*IC					4.915	1.60
Brdfemale*IC					-3.241	-0.65
OC*IC					-6.527	-0.59
OC ² *IC					9.754	0.53
No. of obs.	512		444		444	
R ²	0.808		0.823		0.827	
Adj. R ²	0.806		0.819		0.821	
F-value	353.95		182.72		127.98	
F sig.	0.000		0.000		0.000	

Note:

(1) The table reports multiple regression results of the following models:

Model 5 RII(1): $Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \epsilon$

Model 6 RII(2): $Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \gamma_7 Brdsize + \gamma_8 Brdindp + \gamma_9 Brdfemale + \gamma_{10} OC + \gamma_{11} OC^2 + \epsilon$

Model 7 RII(3): $Pit = \gamma_0 + \gamma_1 Ei + \gamma_2 BVi + \gamma_3 IC + \gamma_4 Firmsize + \gamma_5 Lev + \gamma_6 Industries + \gamma_7 Brdsize + \gamma_8 Brdindp + \gamma_9 Brdfemale + \gamma_{10} OC + \gamma_{11} OC^2 + \gamma_{12} Brdindp * IC + \gamma_{13} Brdindp * IC + \gamma_{14} Brdfemale * IC + \gamma_{15} OC * IC + \gamma_{16} OC^2 * IC + \epsilon$

(2) *, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.

With regard to the value relevance of intellectual capital, Model 5 and Model 6 confirm that intellectual capital disclosure has a significant positive impact on a firm's market value. However, the evidence becomes weaker after more variables enter into the regression (1% significance in Model 5 and 10% significance in Model 6). Furthermore, the coefficient of IC score becomes significantly negative in the full

model (Model 7). It means that higher level of intellectual capital disclosure lowers firm value after corporate governance factors enter into the regression. Although unexpected, this result is not surprising. In Habib and Azim (2008) and Veltri and Silvestri (2011), the coefficients of accounting variables reduce while more variables are added to the model. In addition, a negative impact of intellectual capital/intangible disclosure has also been observed in some studies (e.g. Cazavan-Jeny and Jeanjean, 2006). The inverse relationship might be due to the special nature of intellectual capital information. Increased level of intellectual capital disclosure can be two-edged sword. Because of the proprietary costs discussed in Verrecchia (1983), although increased disclosure improves the ability of shareholders and directors to monitor their managers, the additional information might also reveal confidential information to the competitors. As such, a company loses its competitiveness, which may consequently hinder its future earnings potential.

To test the hypotheses H1b, H2b, H3b, and H4b, following the testing methods in Habib and Azim (2008), if a factor has a positive and significant impact on the value relevance of the information, the coefficient of interaction term of these two (factor and information) will be positive and significant. In Model 7, of all examining factors, only the coefficient of Brdsize-IC score interaction term is positive and significant (coefficient = 0.925 and p-value < 0.01). This means that only board size has a positive impact on the creditability of intellectual capital disclosure. Therefore, only H1b is verified.

The coefficient of Brdindp interaction term is positive but insignificant. Therefore, H2b is not supported. According to Osterloh and Frey (2006), only insiders can

evaluate firm-specific knowledge generation and transformation. Outsiders, on the other hand, do not have sufficient relevant knowledge. They can only make decisions based on the information supplied by insiders. In addition, they also argue that outsider directors focus on the financial consequences of investment rather than the evaluation of the quality of knowledge process itself. Therefore, there is a limitation for independent directors' ability to improve the credibility of firm-specific knowledge disclosure. This might explain the non-significant coefficient of $Brdindp$ interaction term. The coefficient of gender diversity interaction term is negative and insignificant, thus H3b is not supported.

H4b predicts the association between ownership concentration and the value relevance of intellectual capital. In Table 10, Model 7 shows that the directions of coefficient of OC and OC^2 are contradictory to the expectation and are non-significant, which means that ownership concentration level does not have any impact on the value relevance of intellectual capital disclosure. Therefore, H4b is not supported.

To some extent, these results confirm the argument made in Marston and Shrides (1991) that the quantity of information cannot be used as proxy for information quality. The findings indicate that higher level of disclosure does not necessarily have a positive impact on the quality of disclosed information.

6.3.2 The value relevance of intellectual capital disclosure: Individual components analysis

Table 11 presents the value relevance analysis for individual intellectual capital components: human capital (Model 8), relational capital (Model 9) and structural capital (Model 10). Model 8 (human capital) produces the highest adjust R^2 of 0.830 among all models including main model and structural capital model has the lowest adjusted R^2 of 0.817. This implies that human capital disclosure is the most efficient indicator for firm market value estimation. This is consistent with Veltri and Silverstri (2011), who provide empirical evidence that human capital is more value relevant to investors than any other type of intellectual capital.

Table 11 The value relevance of intellectual capital: Individual components analysis

Variables	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics
	<i>Model 8 : Human capital</i>		<i>Model 9: Relation capital</i>		<i>Model 10 : Structural capital</i>	
Intercept	-1.448	-1.59	-2.031**	-2.08	-3.284*	-3.62
E	1.685*	6.51	1.743*	6.60	1.744*	6.65
BV	1.128*	22.84	1.159*	23.07	1.153*	22.93
IC	-7.338*	-3.21	-4.387***	-1.84	-1.852	-0.53
Firm Size	0.105**	2.16	0.085***	1.81	0.096**	2.02
Leverage	0.273**	1.98	0.294**	2.11	0.297**	2.12
Industries	0.448*	2.85	0.519*	3.28	0.557*	3.55
Brdsize	-0.166***	-1.79	-0.058	-0.64	0.016	0.21
Brdindp	-0.245	-0.37	-0.000	-0.00	1.137**	2.04
Brdfemale	1.769***	1.70	2.240**	2.32	2.198**	2.24
OC	1.882	0.95	2.434	1.05	2.573	1.39
OC ²	-3.417	-1.10	-4.463	-1.14	-4.786	-1.63
Brdsize*IC	0.859*	3.56	0.516***	1.96	0.591	1.45
Brdindp*IC	4.893**	2.42	3.992***	1.72	-0.688	-0.19
Brdfemale*IC	-0.861	-0.24	-2.788	-0.76	-4.592	-0.67
OC*IC	-4.497	-0.64	-5.388	-0.64	-8.746	-0.79
OC ² *IC	3.779	0.35	7.162	0.51	15.487	0.92
No. of obs.	444		444		444	
R ²	0.830		0.826		0.824	
Adj. R ²	0.824		0.819		0.817	
F-value	130.28		126.57		124.49	
F sig.	0.000		0.000		0.000	

Note:

(1) Model 8, 9 and 10 replace total IC score with human capital, relational capital and structural capital in RII (3) (Model 7 in Table 10) (see Table 4 for the measurement of individual components)

(2) *, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.

The coefficients of earnings and book value of equity of all models are positive and significant. These results are robust to various types of intellectual capital. This is consistent with Veltri and Silverstri, 2011, who provide evidence that book value equity and earnings are significant regardless the choices of information as “other information”.

In terms of the impact of board structure and ownership concentration on the value relevance of individual intellectual capital components, the coefficients of Brdsize and Brdindp interaction terms are positive and significant in model 8 and 9 (human capital

and relational capital), which means that larger boards and more independent directors have a positive impact on the quality of human capital and relational capital disclosure. The value relevance of structural capital disclosure, however, is not associated with board structure characteristics. As structural capital comprises mainly of internal sharing knowledge of an organisation, this result confirms Osterloh and Frey's (2006) argument that the ability of independent directors to improve the value relevance of structural capital might be limited because they do not have sufficient firm-specific knowledge. With regard to the general information such as human and relational capital, consistent with the expectations, board size and independence improve the quality (i.e. value relevance) of information because of the enhanced monitoring function of the board. Similar to the main model, board gender diversity and ownership concentration do not have any impact on the value relevance of intellectual capital disclosure.

6.4 Sensitivity analysis

Heteroscedasticity is a major concern in regression analysis. Considering that the multiple regression models may contain heteroscedasticity residuals, the robustness tests for heteroscedasticity are conducted. Overall, the results of the sensitivity analysis are quantitatively similar to the main findings.⁹

⁹ See Appendix C for the results of robust models.

6.5 Discussion of key findings

6.5.1 The level and extent of intellectual capital disclosure

Consistent with Guthrie and Petty (2000) and Bontis (2003), the average level of intellectual capital disclosure for New Zealand listed companies is low, and there is no established universally accepted framework for intellectual capital reporting. The average disclosure level remains constant during the period from 2008 to 2011. Despite the low average of the overall intellectual capital disclosure level, evidence shows that items related to human capital, especially the information related to the board of directors are most frequently disclosed. These results confirm the importance of the board in corporate decision making process proposed by Fama and Jensen (1983). However, this high disclosure level may be partially driven by the requirement of the NZX Listing Rules regarding the disclosure of the compliance of the Code. On the other hand, the results reveal that the average disclosure level of structural capital is the lowest among three individual components. The reason for this could be that firms have attempted to avoid the proprietary costs by limiting the disclosure to the mandatory level. Again, consistent with Guthrie and Petty (2000) and Bontis (2003), intellectual property is the most frequently structural capital item.

6.5.2 Board structure, ownership concentration and the level of intellectual capital disclosure

This thesis provides strong evidence that board size and independence have a significant positive impact on the level of intellectual capital disclosure. Consistent with the theoretical argument made by Fama and Jensen (1983), empirical studies

(e.g. Abeysekera, 2010; Hidalgo et al., 2011; Arcay and Vazquez, 2005; Li et al., 2008) and H1a and H2a, the results indicate that firms with a larger board and more independent directors on the board exhibit a higher level of intellectual capital disclosure. However, there is only marginal evidence showing that board gender diversity positively influences the level of intellectual capital. The univariate tests provide strong evidence to support hypothesis 3a. However, in multivariate tests, there is no evidence supporting this hypothesis. This might be explained by the low average number of females on board in New Zealand firms. Prior studies (e.g. Adams and Ferreira, 2009) that find a positive impact of board gender diversity are based on the sample comprising only large firms, which have a higher percentage of female directors on board.

Consistent with H4a, the results indicate that the impact of ownership concentration on the level of intellectual capital disclosure is positive at the low concentration level and becomes negative at the high concentration level. In line with prior research, this thesis provides further evidence for the non-linear relationship between ownership concentration and the level of intellectual capital disclosure (e.g. Makhija and Patton, 2004; Jiang and Habib, 2009).

Further tests show that the significant impact of board structure on the level of intellectual capital is robust to various types of the intellectual capital. Board size and independence influence the level of all three individual components disclosure in the same way as overall intellectual capital disclosure. Gender diversity has no impact on any type of intellectual capital. Ownership concentration has non-linear relationship

with the levels of human and relational capital disclosures, but not that of structural capital disclosure.

6.5.3 Board structure, ownership concentration and the value relevance of disclosure

The results indicate that the explanatory power of regression with board structure and ownership concentration variables is higher than the models excluding them. According to Barth et al. (2000), the higher explanatory power of the regression (R^2) is considered as the evidence of more value relevance.

This thesis only provides evidence that board size has a significant positive impact on the value relevance of intellectual capital (H1b). However, Hypotheses H2b, H3b, and H4b are not supported. Osterloh and Frey (2006) argue that outsiders may not have sufficient firm-specific knowledge. This limits the ability of outsider to improve the quality of information. Consistent with this argument, the results of the value relevance of individual component disclosure indicates that board independence positively relates to the value relevance of human and relational capital disclosure. However, board independence is not significantly associated with the value relevance of structural capital disclosure, which mainly consists of firm-specific knowledge. In regard to other factors such as gender diversity and ownership concentration, there is limited empirical research addressing these questions.

6.6 Summary

This chapter presents and discusses the descriptive statistics relating to the intellectual capital disclosure and hypothesis testing for the influence of three board structure

indicators and ownership concentration on the level and value relevance of intellectual capital in New Zealand. The findings show strong evidence that firms with a larger board and more independent directors on board disclose a higher level of intellectual capital disclosure. There is only marginal evidence that gender diversity is positively associated with the level of disclosure. The empirical evidence also supports the non-linear relationship between ownership concentration and the level of disclosure. In regard to the value relevance of intellectual capital disclosure, only board size is proved to have a positive impact on the value relevance of this disclosure. The next chapter provides a summary and discussion of the key findings in relating to the research questions. The implications, contributions, limitations and directions for future research are also presented in the next chapter.

CHAPTER SEVEN

CONCLUSION

This thesis has investigated the impact of board structure and ownership concentration on the level and value relevance of intellectual capital disclosure. There has been an increased focus in the academic discussion on the importance of intellectual capital disclosure in the modern economy. Strategic management researchers indicate that intellectual capital plays a significant role in determining a firm's competitiveness and it is also an important source of economic value creation (e.g. Barney, 1991; Goldfinger, 1997). In addition, capital markets research literature reveals that the association between financial information under traditional accounting and market value in the new knowledge-based economy has declined (e.g. Lev and Zarowin, 1999; Francis and Schipper, 1999). This increased gap between a firm's book and market values can be explained by the intellectual capital that is not recognised in firm's financial statements (Brennan and Connell, 2000). Despite the growing recognition of the importance of intellectual capital, there is limited research on how intellectual capital disclosure is related to corporate governance mechanisms such as board structure and ownership concentration, especially based on the post-IFRS adoption data and in the New Zealand context. Motivated by those factors, two key research questions have been addressed: (1) do board structure and ownership concentration have any impact on the level of intellectual capital disclosure?, and (2) do board structure and ownership concentration have any impact on the value relevance of intellectual capital disclosure? In this chapter, section 7.1 summaries the key findings in relation to the research questions are provided. Section 7.2 and 7.3 provide the

implications and major contributions of this thesis. Finally, section 7.4 concludes this chapter with a discussion of the limitations of this thesis and directions for future research.

7.1 Summary and discussion of findings

Chapter two examines the conceptual issues surrounding intellectual capital and the characteristics of New Zealand corporate governance systems in relation to board structure and ownership concentration. The issues relating to intellectual capital include the definition and classification of intellectual capital. It is shown that there is absence of a mutually agreed framework to define and classify the intellectual capital among accounting professions and academics. As a result, intellectual capital is expressed by different terms, defined in various ways and classified into different categories in the literature and accounting standards. In regard to corporate governance systems in New Zealand, the recent changes in the NZX Listing Rules in relation to the minimum requirements of board size and board independence may shape the board structure of New Zealand listed firms. In addition, it is argued that New Zealand does not have any statutory takeover code and strong protection for minority shareholders. Therefore, the ownership concentration level among New Zealand firms should be higher than other countries. Further, the less stringent regulatory environment in New Zealand provides a unique opportunity to observe the relationship between board structure, ownership concentration and intellectual capital disclosure.

Chapter three provides a review of both theoretical arguments and empirical work in relation to the intellectual capital disclosure and the effect of board structure and

ownership concentration on the level and value relevance of intellectual capital disclosure. This chapter has identified a few gaps in prior research. First, there is a limited research on intellectual capital disclosure in the post-IFRS adoption period and in the New Zealand context. As a result of the absence of regulation, intellectual capital disclosure is more likely affected by firm-specific and country-specific factors. Therefore, a country-specific study is needed. In addition, the mandatory NZ IFRSs adoption in 2007 may influence the disclosure of intellectual capital by firms because there are some significant changes from the old GAAP to NZ IFRS. Second, much of empirical research investigating the impact of board structure and ownership concentration on the level of intellectual capital disclosure is based on small samples, which may not be sufficient to capture the overall impact of corporate governance mechanisms on the level of disclosure. Further, no prior studies have investigated the impact of board gender diversity on the level and value relevance of intellectual capital disclosure. Finally, there is limited literature addressing the impact of board structure and ownership concentration on the quality of intellectual capital disclosure.

Given the limitations of the extant disclosure research, based on an application of agency theory, cost-benefit theory and value relevance approach, chapter four develops hypotheses to examine the research questions. Three aspects of board structure are expected to have linear relationship with the level and value relevance of intellectual capital disclosure. Indicators such as board size, board independence and gender diversity enhance the monitoring function of the board, and thus are expected to have a positive impact on the level and quality of the disclosure. The impact of ownership concentration is non-linear because of the mix effect of entrenchment and alignment effects at different ownership concentration levels. Therefore, it is expected

that ownership concentration positively relates to the level and quality of intellectual capital disclosure at a low level of ownership concentration, and these effects become negative when the ownership concentration reaches to a high level.

Chapter five describes the research design used to test the hypotheses developed in chapter four. The final sample includes 155 New Zealand listed firms covering a total of 519 firm-years during the period between 1 January 2008 and 31 August 2011, excluding equity trusts and funds entities and the firms without internal management team and employees. Chapter five also explains the development of the research instruments and models for hypothesis testing, which include a disclosure index and multiple regression models. The measures of all variables used in the model are also explained in chapter five.

The presentation and discussion of empirical results are reported in chapter six. The investigation of the level and extent of intellectual capital disclosure reveals that the average disclosure level for New Zealand listed firms is low (18.70%). In addition, there is no established mutually agreed framework for intellectual capital reporting in New Zealand. On closer examination of the extent of the disclosure, the results indicate that human capital relating to the quality of the board is most frequently disclosed by the firms. On the other hand, it is apparent that firms are reluctant to voluntarily disclose information regarding the structural capital except for the intellectual property.

This thesis provides strong evidence of the significant positive impact of board size and independence on the level of intellectual capital disclosure. These findings confirm that a larger board and higher percentage of independent directors on board

enhance the monitoring function of the board. Also, only marginal evidence is provided for the positive influence of board gender diversity on the level of disclosure. This significant relationship can only be found in the univariate tests. In addition, consistent with the expectations, the findings support that ownership concentration positively influences the level of disclosure. This relationship becomes negative when the ownership concentration reaches to a high level.

The results of the hypotheses tests in relation to the value relevance of intellectual capital disclosure reveal that the inclusion of board structure and ownership concentration variables into the regression improves the value relevance of the regression model of share price on reported information (indicated by the higher adjusted R^2 of the regression). However, in the individual hypotheses tests, only board size is proved to have significant influence on the value relevance of the intellectual capital disclosure. These results indicate that the quantity of information cannot be used as a proxy for the quality of information.

7.2 Implications

The findings of this thesis have important implications for regulators, accounting standard setting bodies and internal and external information users. First, the results confirm that to some extent, better board structure positively influences the level and quality of voluntary intellectual capital disclosure. As such, in the absence of accounting regulations, the reliability and relevance of corporate disclosure can be controlled through other types of regulation. From a regulatory perspective, the implication is whether the NZX Listing Rules should strengthen the corporate governance regulations in relation to board structure. A tougher regulatory

environment enhances the quality of corporate disclosure, and more importantly, it brings New Zealand in line with the practices of other major stock exchanges (e.g. the U.S.). In terms of ownership concentration, as the impact of ownership concentration is non-linear, another policy implication is the need for the governance intervention in the majority-minority shareholders and shareholder-management relations, in order to maintain the ownership concentration for New Zealand firms at an optimum level.

Second, the results have implications for the New Zealand accounting standards setting bodies. The results indicate that the intellectual capital disclosure has some associations with the capital markets and it delivers important message to the information users. Therefore, there is a need for a standardised framework for intellectual capital reporting. As a result, the intellectual capital reporting will be more regulated and more informative to information users. In addition, the disclosure based on the same framework can be used for comparison purposes (e.g. industry standard and country standard).

Finally, this thesis confirms that intellectual capital disclosure can be used to estimate a firm's market value. However, information users have to interpret the disclosed information with caution. First, intellectual capital is not regulated, so that the quality of this information is not guaranteed. Second, the value relevance of the information is affected by other firm-specific factors such as board size. Therefore, external information users should consider other features related to a firm when decide to using this information to estimate the firm's market value.

7.3 Major contributions

The methodology employed and the evidence presented in this thesis contribute to the literature in several ways. First, this is one of the few studies examining the intellectual capital disclosure in the post-IFRS adoption period and in the New Zealand context. Therefore, this thesis provides an insight into the relationship between corporate governance mechanisms and intellectual capital disclosure in a less stringent regulatory environment. Also, the examination in this thesis is based on the post-IFRS adoption data, which provides the latest evidence in this field. Further, this thesis provides a full picture of intellectual capital disclosure behaviour of New Zealand firms by investigating the annual reports of all listed firms (excluding certain companies).

Second, this thesis provides strong evidence supporting the positive influence of board size, board independence on the level of voluntary disclosure, and non-linear relationship between ownership concentration and the level of disclosure. In addition, moderate evidence of the positive impact of board size and board independence on the quality of intellectual capital disclosure is also provided. Further, this thesis extends the traditional measures of board structure by examining the association between board gender diversity and intellectual capital disclosure, which has not been examined in prior research. However, only marginal evidence has been found. Also, although gender diversity has not been found to have a positive impact on the value relevance of intellectual capital, there are some indications that gender diversity improves the level of disclosure and a firm's market value.

Third, much of the literature limits the scope of the study to either the level of disclosure or the quality of disclosure. This thesis examines both aspects of the intellectual capital disclosure. By adopting the value relevance approach to measure the quality of the information, the results confirm the argument made by Marston and Shrives (1991) that the quantity of information cannot be used as a proxy for the quality of information. Further, this thesis is one of the few studies addressing the influence of corporate governance on the value relevance of non-financial voluntary information. To some extent, the results confirm that the corporate governance structure does not only influence the level of disclosure but also the informativeness of disclosure.

Finally, this thesis contributes to the literature by developing a self-constructed intellectual capital disclosure index. Instead of using an existing index, a customised disclosure index is design based on a wide range of definitions, classifications and indices developed in prior research. The final disclosure index includes most of the relevant intellectual capital items and is adjusted for the New Zealand context.

7.4 Limitations and directions for future research

The first major limitation is the limitation of the data available in the post-IFRSs adoption period. The thesis examines the annual reports released up to 31 August 2011, which are the most recent annual reports can be collected for this thesis. Future research can extend this study when more post-IFRSs adoption data is available.

Another limitation is that this thesis focuses on a small capital market with less stringent rules. Therefore, the generalisability of the results reported in this thesis is only limited to the similar jurisdictions.

Third, this thesis uses value relevance approach to measure the quality of information, which only measures the association between reported information and market value. Future studies could use other proxies for accounting information quality such as the level of earnings management, timely loss recognition and persistence and accruals (Dechow et al., 2010).

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APPENDIX A

DISCLOSURE INDEX

Code	Items	Description
1.0	Human capital	Intellectual capital component
1.1	Board of directors	Sub-category
1.1.1	Photos and ages of directors	Photos or/and biological age of directors. The information provides information users some first impressions of firm's directors.
1.1.2	Backgrounds of directors	Educational background or/and work experience. The item measures directors' knowledge and skills.
1.1.3	Comments on directors	It refers to the general discussion of board structure, directors' work-related competence, achievement, etc.
1.2	Top management	Sub-category
1.2.4	Members of top management	It refers names, photos, and/or age of top managers.
1.2.5	Backgrounds of top management	Educational background or/and work experience of top managers.
1.2.6	Comments on top management	Comments on the abilities of top management team.
1.3	Employees	Sub-category
1.3.7	Employee statistics	General discussion of employee structures such as employee count, employee diversity (e.g. ethnicity, gender, etc), employee breakdown by departments, segments, seniority, etc.
1.3.8	Changes in employee structure	Description of changes in employee structure and/or reasons for the changes.
1.3.9	Comments on employees	Comments on employees structure, abilities, flexibilities, etc.
1.3.10	Training policy	It includes disclosure such as training policies, programmes, and expected outcomes. The quality of training policy and activities enhance the capabilities of employees.

Code	Items	Description (<i>continued</i>)
1.3.11	Training activities	It refers detailed activities reflecting training policies, employee involvements, training costs and results. The purpose of 1.3.10 and 1.3.11 is to differentiate the degree of disclosure regarding training.
1.3.12	Recruitment	This item refers to recruitment policies, selection process, etc. The recruitment process guarantees the work-related competence of employees.
1.3.13	Health and safety policies	Description and discussion of health and safety policies and issues.
1.3.14	Employee motivations	It includes description of financial incentive system (e.g. remuneration contract, opportunities) and other non-financial incentives (e.g. life-work balance, working environment, equality).
1.3.15	Employee communication	Statements of employee communication policy (e.g. process of understanding employee satisfaction).
1.4	Other	Sub-category
1.4.16	Other disclosure	It refers to other disclosure of human capital information (e.g. special display such as interview of corporate personnel).
2.0	Relational capital	Intellectual capital component
2.1	Customer relations	Sub-category
2.1.17	General description	General description of customer relations (e.g. current relationship with customers, discussion of product demand, etc.).
2.1.18	Identification of customer groups	Discussion of targeted customer groups (e.g. size, location, key customers, contracts, etc.).
2.1.19	Customer relation maintenance	It refers to strategies to maintain current customers such as improvement of customer services and quality of products. Policies of post-purchase relations maintenance such as warranty and guarantee are also included.
2.1.20	Acquisition of new customers	Description of company's plans, strategies, activities on acquiring new or more customers.
2.1.21	Customer feedback	It refers to companies' efforts on communicating with customers (e.g. customer satisfaction). It does not include the feedbacks related to R&D output (see 3.4.54).

Code	Items	Description (<i>continued</i>)
2.2	Supplier relations	Sub-category
2.2.22	Supplier relations	General discussion of supply relations.
2.2.23	Leading suppliers	Lists of key suppliers, description of transactions details with key suppliers (e.g. payment terms).
2.2.24	Comments on suppliers	Comments on suppliers and future planning on maintaining supplier relations.
2.3	Investor relations	Sub-category
2.3.25	Investor relations	Discussion of investor relations including communication methods with investors.
2.4	Strategic alliance	Sub-category
2.4.26	Partnerships	Description of business collaborations and partnerships (including the purpose of collaborations).
2.4.27	Comments on partnerships	Comments on partnerships including comments on partners, outcome of partnerships (e.g. effectiveness and efficiency of collaborations).
2.4.28	Favourite contracts	Description of favourite contracts and favourable relationships.
2.4.29	Comments on favourite contracts	Discussion the expected or actual outcome of favourite contracts.
2.5	Other stakeholders	Sub-category
2.5.30	Other stakeholders	It refers to the relationship with other stakeholders which are not covered by customer, supplier, investor, business partner relations as well as 2.5.31 and 2.5.32 (e.g. government, competitors).
2.5.31	Social policies	Description of company's relationship with local communities.
2.5.32	Environmental policies	Statement of environmental policies and activities.
2.6	Marketing	Sub-category
2.6.33	Market reputation and presence	Statement of company image/reputation and description of geographical location/market segmentation. This item describes a firm's leadership in the market.
2.6.34	Brand and specialisation	This item describes companies' competitive advantages.

Code	Items	Description (<i>continued</i>)
2.6.35	Awards and achievements	Lists of company's awards and achievements. It reflects market recognition of company's leadership position and competitive advantages.
2.6.36	Advertising and promotion	The item describes companies' efforts on improving market recognition.
2.6.37	New services	It refers new/wider services offered by acquiring new businesses or expanding the original businesses (new branches), new products (excluding new products developed from R&D process, which is covered in 3.4.53).
3.0	Structural capital	Intellectual capital component
3.1	Intellectual property	(IP) Sub-category
3.1.38	Lists of IP	Lists of all intellectual properties (e.g. special rights, trademarks, etc.).
3.1.39	Features of IP	Discussion on main features and benefits of IP. It does not include mandatory quantitative disclosure required by the standards.
3.1.40	Internal generated IP	Details of internal generated IP.
3.2	Information technology system	(IT) Sub-category
3.2.41	IT system	General description of company's software and hardware (e.g. name and function of IT system).
3.2.42	Breakdown of IT costs	Other information relating to IT (e.g. detailed breakdown of IT costs including training and other related costs). Mandatory disclosure of total IT costs as a whole does not considered as detailed information.
3.2.43	Online management and trading	Description of online management and trading, maintenance, training and other related disclosure.
3.2.44	Investment in IT	Statement on IT investment strategy, planning and activities.
3.3	Management process	Sub-category
3.3.45	Corporate philosophy	Statement of organisational culture, value, vision and core purpose.
3.3.46	Information and knowledge sharing	Description of internal and external sharing knowledge and information.

Code	Items	Description (<i>continued</i>)
3.3.47	Flexibilities and organisation learning	Flexibilities refers to company's ability to face challenges (e.g. economic recession, financial difficulties, etc.) and changes (e.g. changes in customer spending behaviour); Organisation learning includes the abilities of a company learn from past experience, feedback and failures.
3.4	Research and development	(R&D) Sub-category
3.4.48	General discussion of R&D activities	The discussion includes policy, strategies and/or objectives of R&D activities as well as competitors' information.
3.4.49	R&D investment	Discussion of R&D spending, investment intensity and/or other costing information. Mandatory disclosure does not include in the item.
3.4.50	R&D centres and research partnership	Discussion of available R&D centres and research partnerships.
3.4.51	R&D activities	Description of current R&D activities.
3.4.52	Future prospects of R&D	Statement on future planning, strategies, activities regarding R&D.
3.4.53	R&D output	Description of R&D output such as new products or new methods.
3.4.54	Feedback	Feedback of R&D output (e.g. customer satisfaction, sales volume). The item only refers to the feedback related to R&D output. General feedback is scored under 2.1.21.

APPENDIX B

INDUSTRY CLASSIFICATION

“High-tech” industries	“Low-tech” industries
Automobile and components	Commercial services and supplies
Banks	Consumer durables and apparels
Capital goods	Consumer services
Commercial services and supplies	Energy
Consumer services	Food, beverage and tobacco
Diversified financials	Food staples and retailing
Health care equipment and services	Materials
Insurance	Retail
Media	Transportation
Pharmaceuticals, biotechnology and life sciences	Utilities
Real estate	
Semi-conductors and semi-conductors equipment	
Software and services	
Technology, hardware and equipment	
Telecommunication services	
<i>Whiting and Woodcock’s (2011) modified GISC framework</i>	

APPENDIX C SENSITIVITY ANALYSIS RESULTS

Table 12 Robust model for the level of intellectual capital

Variables	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics
	<i>Total IC score</i>		<i>Human capital</i>		<i>Relational capital</i>		<i>Structural capital</i>	
Intercept	-0.298*	-5.95	-0.602*	-8.80	-0.323*	-4.84	0.019	0.36
Brdsize	0.017*	3.98	0.015**	2.18	0.026*	4.49	0.009**	2.23
Brdindp	0.159*	5.84	0.193*	4.51	0.190*	5.11	0.089*	3.54
Brdfemale	0.043	0.94	0.039	0.64	0.096	1.41	-0.020	-0.54
OC	0.278*	2.93	0.487*	3.31	0.389*	2.75	-0.055	-0.52
OC ²	-0.333**	-2.35	-0.516**	-2.10	-0.478**	-2.08	0.019	0.11
Firm Size	0.014*	4.62	0.030*	7.25	0.013*	3.08	-0.001	-0.22
Leverage	0.006	0.85	-0.004	-0.17	0.018	0.63	0.001	0.19
Profitability	-0.000	-0.08	0.000	0.22	-0.000	-0.08	-0.000	-0.54
Listing Age	0.000	0.76	0.001	1.16	-0.000	-0.05	0.000	0.90
Industries	0.007	0.60	0.033**	1.92	-0.018	-1.16	0.013	1.13
Intstatus	-0.004	-0.23	-0.028	-1.15	-0.002	-0.10	0.016	1.01
No. of obs.	450		450		450		450	
R ²	0.259		0.2881		0.236		0.061	
F-value	13.24		18.45		11.63		2.51	
F sig.	0.000		0.000		0.000		0.003	

Note:

*, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.

Table 13 Robust model for the value relevance of intellectual capital disclosure

Variables	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics	Coefficients	T-statistics
	<i>Total IC score</i>		<i>Human capital</i>		<i>Relational capital</i>		<i>Structural capital</i>	
Intercept	-1.618	-1.29	-1.448	-1.39	-2.031	-1.51	-3.284*	-2.63
E	1.717***	1.69	1.685***	1.66	1.743***	1.69	1.744***	1.67
BV	1.154*	8.17	1.128*	8.47	1.159*	8.00	1.153*	7.91
IC	-7.242**	-1.90	-7.338**	-2.36	-4.387	-1.47	-1.852	-0.51
Firmsize	0.090	1.51	0.105***	1.70	0.085	1.41	0.096**	1.53
Lev	0.289	0.39	0.273	0.37	0.294**	0.38	0.297**	0.37
Industries	0.498**	2.91	0.448*	2.59	0.519*	2.97	0.557*	3.01
Brdsiz	-0.131	-1.06	-0.166	-1.50	-0.058	-0.40	0.016	0.19
Brdindp	-0.090	-0.11	-0.245	-0.34	-0.000	-0.00	1.137***	1.77
Brdfemale	2.21***	1.95	1.769**	2.02	2.240**	2.41	2.198**	2.21
OC	2.283	0.78	1.882	0.86	2.434	0.85	2.573	1.28
OC ²	-4.493	-0.96	-3.417	-1.01	-4.463	-0.95	-4.786	-1.50
Brdsiz*IC	0.925**	2.91	0.859*	2.85	0.516	1.39	0.591	1.23
Brdindp*IC	4.915	1.49	4.893**	2.02	3.992	1.56	-0.688	-0.19
Brdfemale*IC	-3.241	-0.42	-0.861	-0.19	-2.788	-0.49	-4.592	-0.46
OC*IC	-6.527	-0.50	-4.497	-0.52	-5.388	-0.53	-8.746	-0.78
OC ² *IC	9.754	0.48	3.779	0.29	7.162	0.44	15.487	0.92
No. of obs.	444		444		444		444	
R ²	0.827		0.830		0.826		0.824	
F-value	25.94		28.64		26.34		18.15	
F sig.	0.000		0.000		0.000		0.000	

Note:

*, **, *** represent statistical significance at 1%, 5%, and 10% levels, respectively.