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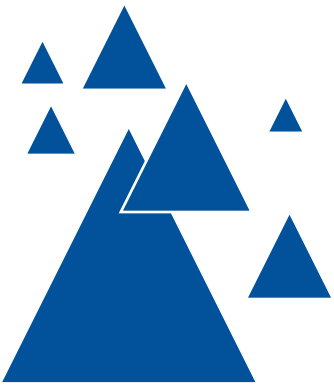
Researchers: Musa Mangena
Richard Pike
Jing Li



Intellectual Capital Disclosure Practices and Effects on the Cost of Equity Capital: UK Evidence

by

Musa Mangena
Richard Pike
Jing Li

University of Bradford

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FOREWORD

In a knowledge intensive economy, a company's intellectual capital, whether it is derived from its employees, customer databases or brands, undoubtedly contribute to a company's success and its ultimate value. Most of these intangible assets can not be included within a company's balance sheet and intellectual capital disclosures in the annual report and financial statements have been largely voluntary.

There are good reasons why companies may choose not to disclose information about these types of assets, not least the worry about losing competitive advantage, but there are clearly reasons why companies choose to make such voluntary disclosures. It is argued that one reason for disclosing such information is to reduce the information gap between companies and investors and thus reduce the cost of capital. This report investigates the relationship between intellectual capital disclosure and the cost of equity capital.

The results of this study indicate that firms which make greater levels of intellectual capital disclosure benefit from a lower cost of equity capital than firms making lower intellectual capital disclosures. The study estimates that this benefit is significant, at 2.8 percentage points. The benefit of such disclosure is increased within intellectual capital intensive sectors where this differential rises to 3.3 percentage points.

The study compares this benefit with the similar but smaller range of benefit to the cost of equity capital shown by firms making lower or higher levels of voluntary financial disclosure and concludes that intellectual capital disclosure seems to dominate financial disclosure in influencing the cost of equity capital. It recognises that other factors may also be at play and that further research is necessary to investigate the impact of these other factors.

The study also identifies that disclosures regarding intellectual capital are more extensive than previous studies have suggested. It suggests that companies do respond to voluntary reporting guidelines and that further mandatory requirements may not be required.

This project was funded by the Scottish Accountancy Trust for Education and Research (SATER). The Research Committee of The Institute of Chartered Accountants of Scotland (ICAS) has also been happy to support this project. The Committee recognises that the views expressed do not necessarily represent those of ICAS itself, but hopes that the project will add to the debate about the costs and benefits of intellectual capital disclosure.

David Spence
Convener, Research Committee
March 2010

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EXECUTIVE SUMMARY

Background

The growth of the knowledge-intensive economy over the last two decades has precipitated considerable interest in the role of intellectual capital in organisations. There seems to be general consensus that intellectual capital is an integral part of a firm's value-creating processes and is important for creating and maintaining competitive advantage (see OECD, 2006; Holland, 2006). Indeed, firms invest heavily in intellectual capital (also called intangible assets), such as research and development, brand development, franchises, customer-base creation, and staff development. However, these internally generated assets are either immediately expensed in the financial statements or arbitrarily amortised and therefore are not fully reflected in the financial statements. Consequently, the information asymmetries between firms and users of financial reports have become more acute (Barth *et al*., 2001; Holland, 2006), particularly given that intellectual capital investments are unique to specific firms and cannot be inferred by looking at other firms. This has precipitated debate about the value-relevance of traditional financial reports given their failure to fully reflect information about the corporate value-creating processes and activities of the firm (Francis and Shipper, 1999; Lev, 2001). Several research reports (ICAEW, 2003; OECD, 2006) and academic studies (Lev, 2001; Holland, 2006) have called for firms to provide greater disclosure of intellectual capital information in the annual reports. Accounting regulators around the world, for example, the Accounting Standards Board in the UK, have issued guidelines (such as the Operating and Financial Review) to assist firms in reporting information, including intellectual capital information.

Indeed the Disclosure and Transparency Rules (FSA, 2007) and the business review (Companies Act, 2006) require firms to report on some intellectual capital information. Inspired by such calls and guidelines, a number of studies investigate the extent to which firms report intellectual capital information in annual reports and other media of communication (see Bozzolan *et al.*, 2005; Unerman *et al.*, 2007; Guthrie *et al.*, 2007). The findings of these studies suggest that, although intellectual capital reporting is still low, there has been an increase in reporting over the years. Unerman *et al.* (2007), for example, also show substantial intellectual capital disclosures even in sectors where intellectual capital may not be expected to be a significant value driver, such as real estate, utilities and retail sectors.

A fundamental issue surrounding the debate about corporate reporting is whether firms benefit from improved disclosure via a lower cost of capital. A commonly expressed view by academics (see Leuz and Verrecchia, 2000; Lev, 2001), practitioners (see Levitt, 1998), and accounting bodies and regulators (see FASB, 2001; IASB, 2002; OECD, 2006) is that enhanced disclosure lowers the cost of capital. The logic of this view derives from the theory which suggests that greater disclosure reduces information asymmetry between managers and investors, thus enhancing market liquidity which lowers the required rate of return (Diamond and Verrecchia, 1991). However, empirical research on the relationship between disclosure and cost of capital is inconclusive (see for example, Botosan, 1997; Richardson and Welker, 2001; Botosan and Plumlee, 2002; Gietzmann and Ireland, 2005). Further, the empirical work suggests that different types of disclosure may affect the cost of capital in different fashions. Consequently, Botosan (2006, p. 38) calls for additional research 'to further our understanding of the impact of different types of disclosure on cost of equity capital'.

Objectives of the study

The objective of this study is to provide some insights into the above by investigating, for the first time, the relationship between the cost of

equity capital and intellectual capital disclosure by UK firms. Intellectual capital disclosure is an important dimension of the voluntary information set for which there is a growing trend in demand in the valuation of firms by investors (Holland, 2003; Burgman and Roos, 2007). It comprises three categories: human capital, structural capital and relational capital. Human capital captures the knowledge, professional skills, experience and innovativeness of employees within an organisation. Structural capital consists of the structures and processes employees develop and deploy in order to be productive, effective and innovative, whilst relational capital captures the knowledge of market channels, customer and supplier relationships, and governmental or industry networks. The key questions addressed by this study are:

- Is there a negative association between the cost of equity capital and level of intellectual capital disclosure in annual reports?
- Is there a negative association between the cost of equity capital and the level of disclosure in the three individual intellectual capital categories (human, structural and relational capital)?
- Does the level of intellectual capital disclosure interact with voluntary financial disclosure to influence the cost of equity capital?

These questions are addressed using data for 126 UK firms listed on the London Stock Exchange. Intellectual capital and voluntary financial disclosures for the firms were measured from the annual reports published between March 2004 and February 2005. The period was deliberately chosen in an attempt to reduce the effect of the Operating and Financial Review (OFR) and IFRS requirements which were to become mandatory starting 2005. Disclosure was measured by a disclosure index, which was constructed from a content analysis of the annual reports. This procedure involved development of a checklist of intellectual capital and financial information items (see Appendix one), and using the checklist, items were scored one if disclosed and zero if not disclosed in the annual

report. The index was computed by dividing the score for the firm by the total number of items in the checklist. The computation of the cost of equity capital was undertaken by applying the price-earnings growth (PEG) model developed by Easton (2004). The model estimates the cost of capital using one-year- and two-year-ahead analysts' earnings forecasts and share price data. This data was obtained from I/B/E/S Datastream. Data analysis was undertaken using descriptive statistics and correlation analyses.

Key findings

The key findings of the analyses are detailed below.

Level of intellectual capital disclosure

- The level of intellectual capital disclosure in UK annual reports is extensive, with a mean disclosure level of 70% of the intellectual capital items used in this study being reported in some way. This is surprisingly high particularly given that intellectual capital reporting is not regulated and, indeed, some recent studies such as Guthrie *et al*. (2007) and Unerman *et al*. (2007) show that intellectual capital disclosures are still low. A possible reason for this is that the annual reports for this study were published in 2004 and 2005. This was the time when the eventually repealed regulations for a mandatory Operating and Financial Review (OFR) were to be introduced. Given that the OFR is a heavily intellectual capital related document, it is possible that firms were already responding to forthcoming regulations.
- In terms of intellectual capital categories, firms seem to provide greater levels of information about human intellectual capital (74.6%) and structural intellectual capital (73.7%) than information on relational intellectual capital (62.3%). Overall, it would seem that firms provide more human intellectual capital information

than in the other two categories, perhaps because of the belief that human capital provides the means by which firms enhance their competitiveness. Hence, firms may disclose more of this information to signal the quality of their human capital and, therefore, their competence to compete.

- Further analysis dividing the firms into intellectual capital intensive sectors (such as banks, insurance, telecommunications, biotech and pharmaceuticals) and non-intellectual capital intensive sectors (such as utilities, retail, and real estate) indicates that both sectors disclose greater information about their human and structural intellectual capital. However, firms in the intellectual capital intensive sectors seem to provide significantly higher relational intellectual capital than non-intellectual capital intensive sectors.

Intellectual capital disclosure and cost of capital

- The average cost of equity capital for the sampled UK listed firms, derived using the price-earnings growth model, is about 10.29%. For most firms (about 84.9% of the sample firms), the cost of equity capital ranges between 5% and 15%. These results are consistent with those reported in Lee *et al*. (2006).
- Intellectual capital disclosure level is negatively associated with the cost of equity capital. Firms with greater levels of intellectual capital disclosure have cost of equity capital estimates ranging from 2.35 to 2.84 percentage points lower than for firms with low intellectual capital disclosures across all categories of intellectual capital. The highest benefit for firms seems to come from a commitment to disclose greater levels of human intellectual capital information, for which there is a 2.84 percentage point difference between the costs of capital of high and low intellectual capital disclosing firms.

- The results also reveal that intellectual capital intensive sectors have a cost of equity capital that is about 0.88 percentage points higher than for firms in non-intellectual capital intensive sectors. Lee *et al*. (2006) attribute the higher cost of capital in these sectors to greater investor uncertainty due to high growth, intense competition and short product life cycles associated with such sectors. An analysis of the intellectual capital intensive sectors suggests that firms with greater disclosure of intellectual capital information benefit significantly more from a lower cost of capital than firms with lower disclosure. The magnitude of the difference in the cost of equity capital is 3.32% lower for intellectual capital intensive sector firms with greater intellectual capital disclosures than those with lower disclosures.
- The findings also support previous studies (such as Pike *et al*., 2000; Holland, 2003) that suggest that investors interact intellectual capital information with financial information in making investment decisions. The cost of capital resulting from interacting intellectual capital disclosure and voluntary financial disclosure scores is 0.28% and 0.88% lower than for the individual intellectual capital and voluntary financial disclosures, respectively.

Conclusions and policy implications

In conclusion, this study investigates the association between intellectual capital disclosure and the cost of capital of UK listed firms. The results of the study indicate that there is extensive disclosure of intellectual capital information by the firms. In terms of the association between intellectual capital disclosure and the cost of capital, the findings of the study reveal that firms with greater intellectual capital disclosure in annual reports have lower cost of capital than firms with lower intellectual capital disclosures. The results also show in line with other previous

studies (Hail, 2002; Botosan, 1997) that voluntary financial disclosure is negatively associated with the cost of capital, although intellectual capital disclosure dominates financial disclosure. Further, the results suggest that financial and intellectual capital information interact to create a richer information set for investors, and firms with higher interaction of intellectual capital and financial disclosures seem to benefit more in terms of low cost of capital. Overall, the findings of this study are consistent with the notion that disclosure of intellectual capital information may reduce uncertainty about the firm's future earnings, leading investors to demand a lower rate of return.

This study contributes to the understanding of the association between disclosure and the cost of capital in two main ways:

- It provides the first evidence of the relationship between the cost of equity capital and intellectual capital disclosure in the context of the UK.
- Unlike previous studies that tend to investigate aggregate annual report disclosures, this is the first study to distinguish between intellectual capital and financial disclosures. This distinction allows a determination of how each of the disclosure types is related to the cost of capital as well as how the two interact with each other to affect the cost of capital. This is particularly important today given the debate on the role of intellectual capital and the weaknesses of the financial reporting model.

Policy implications

The findings are of considerable importance to policy makers, the accounting profession and financial regulators:

- An understanding of whether increased intellectual capital disclosure affects firms' cost of capital provides policy makers and regulators

with a basis upon which to evaluate the costs and benefits of disclosure. In view of the calls to improve the reporting of intellectual capital, these results are useful in evaluating the costs and benefits of potential regulations regarding the disclosure of intellectual capital information.

- The extensive intellectual capital disclosure revealed in this report suggests that the decision to repeal the regulation for a mandatory OFR may have been appropriate as firms respond to voluntary reporting guidelines. The focus for policy should be to develop best practice guidelines for intellectual capital reporting and encourage compliance with such guidelines. Such an approach reduces problems with prescriptive guidelines which require enforcing.
- Insights from these results are also important to managers of firms because they are able to see the benefit of enhanced disclosure in terms of a reduction in their firm's cost of capital. The realisation that there are cost of capital-related benefits in enhancing the reporting of intellectual capital information may lead to a commitment by firms to improve disclosure of this type of information. This will also benefit market participants in terms of having more relevant and quality information available, and therefore reducing the cost of gathering private information.

However, there is still need for further research into the costs and benefits of intellectual capital reporting. Nevertheless, this report shows that intellectual capital disclosures are important to firms and the capital markets.

1 Introduction and Aims of the Study

Introduction

There has been much research investigating the economic consequences of information disclosure. Christensen *et al*. (2007) suggest that such research has been motivated, in the main, by the notion that research on reporting consequences has implications for policy making, particularly, to the standard-setting process. The underlying argument is that understanding the economic consequences of information disclosure can provide a basis for evaluating the costs and benefits of disclosure (Leuz and Verrecchia, 2000; Verrecchia, 2001; Healy and Palepu, 2001), which are an important consideration in the standard-setting process (Barth *et al*., 2001; Botosan, 2006).

In the context of the consequences of disclosure, an important and perhaps controversial issue for managers, academics and policy makers is whether firms benefit from increased disclosure via a lower cost of capital. Whilst some (for example, FASB, 2001, IASB, 2002; ASB, 2007) suggest that disclosure reduces cost of capital, others (see Financial Times, May 7, 1999; Bushee and Noe, 2000; Botosan and Plumlee, 2002) argue that enhanced disclosure, particularly via timely reports (such as quarterly reports), increases share price volatility. For example, Bushee and Noe (2000) show that increases in disclosure attract institutions that trade aggressively for short-term gains, thus exacerbating share price volatility. High share price volatility increases a firm's perceived riskiness thereby raising the cost of capital. In the light of such debates, a number of studies have attempted to provide insights into the relationship between the cost of equity capital and aggregate disclosures (Botosan, 1997; Botosan and Plumlee, 2002; Hail, 2002; Francis *et al*., 2005; Espinosa

and Trombetta, 2007), social disclosures (Richardson and Welker, 2001), quarterly and other public relations disclosures (Botosan and Plumlee, 2002) and timely strategic disclosures (Gietzmann and Ireland, 2005).

In a review of these studies Botosan (2006) shows that the findings are generally mixed, and even more importantly, suggests that different types of disclosures may also affect the cost of capital in different fashions. For example, whilst some studies document a negative relationship with aggregate disclosures (Botosan, 1997; Hail, 2002; Francis *et al.*, 2005) and timely strategic disclosures (Gietzmann and Ireland, 2005), others show a positive relationship with social disclosures (Richardson and Welker, 2001) and timely (quarterly report) disclosures (Botosan and Plumlee, 2002). Yet others reveal no relationship between the cost of capital and investor relations activities (Botosan and Plumlee, 2002) and no evidence of a lower cost of capital for switching from local to IFRS/US GAAP (Daske, 2006). Consequently, Botosan (2006, p. 38) calls for additional research 'to further our understanding of the impact of different types of disclosure on cost of equity capital'. Healy and Palepu (2001) also conclude, after an extensive review of the disclosure literature, that additional research is required to understand: (i) why firms engage in voluntary disclosure; and (ii) if disclosure affects the cost of capital. Similarly, Bushee *et al.* (2003) also point out that although many disclosure studies have investigated disclosure, there still exists limited evidence regarding the capital market impact of broadly disseminating information.

This study contributes to the debate on disclosure and cost of capital relationships by considering intellectual capital disclosure. Intellectual capital disclosure is an important dimension of voluntary information for which there is growing demand (Holland, 2003, 2006; Burgman and Roos, 2007), yet limited evidence exists on the capital market impact of enhancing dissemination of the information. Over the last two decades, intellectual capital has attracted considerable interest from both practitioners and academic researchers. This increased attention has been primarily stimulated by the perceived role it plays in the

value-creation processes and activities within firms. Intellectual capital is largely seen as an integral part of the firm's value-creating processes (Pike *et al.*, 2000; Holland, 2003; Bukh *et al.*, 2005; OECD, 2006) as well as creating and maintaining competitive advantage (Holland, 2006). In today's dynamic business environment, firms invest heavily in intellectual capital assets (also called intangibles) such as research and development, brand development, franchises, customer-base creation, and staff development. The problem, however, is that these investments are either immediately expensed in the financial statements or arbitrarily amortised and therefore are not fully reflected in the financial statements. Consequently, the book values of firms with significant amounts of intellectual capital investments are unrelated to the market values (Amir and Lev, 1996; Brennan, 2001; Lev, 2001; Holland, 2003). This, it is argued, has reduced the value-relevance of traditional financial reports (Francis and Schipper, 1999; Lev and Zarowin, 1999). Barth *et al.* (2001) and Holland (2003; 2006) argue that this has increased the information asymmetry between firms and users of financial reports. Aboody and Lev (2000) suggest that the information asymmetry between managers and users is more acute for intellectual capital than for other disclosures because it is unique to specific firms and cannot be inferred by looking at other firms. This creates increased opportunities for moral hazard, adverse selection and other opportunistic behaviour by managers (Aboody and Lev, 2000; Holland, 2006).

In the light of the growing importance of intellectual capital and the limited value-relevance of traditional financial reports, a number of research reports (Beattie, 1999; FASB, 2001; ICAEW, 2003; OECD, 2006; ASB, 2007) and academic studies (Aboody and Lev, 1998; Francis and Schipper, 1999; Lev, 2001; Holland, 2006) have called for firms to provide greater disclosure of intellectual capital information. These reports and studies argue that intellectual capital information is the dominating factor in the process of valuing firms by investors. Holland (2001; 2003; 2006) concludes, after interviewing fund managers and

analysts, that the market demands intellectual capital information and has incentives to create and use the information on the role of intellectual capital in corporate value-creation when making investment decisions. Additionally, Ernst & Young (1997) and Rajgopal *et al.* (2003) also suggest that analysts consider intellectual capital information when they make earnings forecasts. Barth *et al.* (2001) and Barron *et al.* (2002) document that analyst coverage is greater for firms with intensive research and development and advertising expenses relative to their business. Similarly, other studies show that specific intellectual capital indicators, such as research and development expenses (Amir and Lev, 1996; Ballester *et al.*, 2003), capitalisation of software development costs (Lev and Sougiannis, 1996; Aboody and Lev, 1998), and customer satisfaction (Ittner and Larcker, 1998) have an impact on share prices, suggesting that investors find them relevant for share valuation.

These reports and studies inspired researchers to investigate the extent to which intellectual capital information is reported in annual reports (see Brennan, 2001; Vandemaele *et al.*, 2005; Bozzolan *et al.*, 2005; Guthrie *et al.*, 2007). Such research documents that although intellectual capital reporting is still low, there has been an increase in intellectual capital disclosure in annual reports over the years. Unerman *et al.* (2007), for example, also show substantial intellectual capital disclosures even in sectors intellectual capital may not be expected to be a significant value driver (such as real estate, utilities and retail). In spite of these studies, a key issue that has not been considered in the literature is whether firms benefit from improved intellectual capital disclosure via a lower cost of capital. Reducing the cost of capital has been suggested by academics (see Lev, 2001) and accounting bodies and regulators (see FASB, 2001; ICAEW, 2003; OECD, 2006) as the benefit of enhanced intellectual capital disclosure.

Aims of the study

The aim of this study is to investigate the relationship between the cost of equity capital and intellectual capital disclosure. From a theoretical perspective (see Verrecchia, 2001; Gietzmann and Trombetta, 2003), and to the extent that intellectual capital is critical for firm valuations (see Lev, 2001; Holland, 2003; ICAEW, 2003), improved disclosure of intellectual capital information should help to reduce information asymmetry and the cost of capital. Although there are many studies investigating voluntary disclosure, the extent to which enhanced levels of intellectual capital disclosure benefits firms in terms of cost of capital has received very little attention. Much of the research on the consequences of intellectual capital disclosure has tended to focus on examining the relationship between share prices and specific intellectual capital indicators (Lev and Sougiannis, 1996; Ballester *et al.*, 2003), rather than the cost of capital. The exceptions to this are Singh and Van der Zahn (2007), who investigate the association between underpricing (as a proxy for cost of capital) and intellectual capital disclosures amongst Singapore initial public offerings (IPOs), and Kristandl and Bontis (2007), who examine the relationship between forward-looking and historical information and the cost of capital for listed companies in Austria, Germany, Sweden and Denmark. The results of these two studies are mixed. Whilst Singh and Van der Zahn (2007) find a positive association between underpricing and the extent of intellectual capital disclosure, Kristandl and Bontis (2007) report a negative relationship between forward-looking (intellectual capital) information and cost of capital. In addition, Sing and Van der Zahn (2007) use under-pricing rather than the cost of capital directly and does not consider the effect of financial disclosures. Kristandl and Bontis (2007) employ only a limited number of intellectual capital information items and their historical information only includes stock market information. Additionally, the study does not consider the interaction effects of historical and

intellectual capital disclosures on the cost of capital. Furthermore, none of these two studies consider the intellectual capital effects on cost of capital in UK firms despite the fact that intellectual capital is increasingly becoming the key driver of the UK economy (ICAEW, 2003; Unerman *et al.*, 2007).

As noted earlier, prior studies have considered the cost of capital effects of either aggregate disclosure (see Botosan, 1997; Hail, 2002; Francis *et al.*, 2005) or certain specific types of disclosure (see Richardson and Welker, 2001; Botosan and Plumlee, 2002; Gietzmann and Ireland, 2005). Consequently, there exists no evidence on how the different types of disclosure combine and interact with each other to influence the cost of capital. It may be the case that specific disclosures (such as intellectual capital) combine and interact with other disclosures (such as financial disclosure) to affect the cost of capital in different fashions. This logic is supported by prior work which suggests that: (1) there is a complementarity between financial and non-financial information in explaining share prices (Amir and Lev, 1996); and (2) intellectual capital combines and interacts with traditional physical and financial assets to create value in ways that are unique to individual firms (Pike *et al.*, 2000; Holland, 2006). Holland's (2003; 2006) work also suggests that even the different intellectual capital categories (human capital, structural capital and relational capital) combine and interact with each other to create value in terms of known cash flows, and in terms of growing the current business. The implication is that investors may, in their investment decision-making processes, use a combination of intellectual capital and financial disclosures to arrive at an appropriate valuation of the firm. Hence, the impact of disclosure on the cost of capital may be influenced by the combination and interaction of difference disclosure types.

In light of the above discussions, this study extends the literature in two main dimensions. First, it examines whether variations in intellectual capital disclosure explains differences in the cost of equity capital of UK listed firms. In this respect, the analyses are carried out at

the aggregate intellectual capital disclosure level as well at the intellectual capital categories level (human capital; structural capital and relational capital) to determine whether the categories are also independently related to the cost of capital. Second, and in line with the literature, the study explores whether intellectual capital disclosure and voluntary financial disclosure interact to influence the cost of equity capital. In order to investigate these issues, the study employs voluntary intellectual capital information disclosed in annual reports. The study also focuses on the cost of equity capital only rather than the cost of debt because UK firms are more reliant on equity capital for funding their activities (see Lee *et al.*, 2006).

Significance of the study

This study is particularly important in the context of the rapidly emerging view among both academics and practitioners that a new reporting model is required to integrate both financial measures and leading indicators of performance in order to enhance investors' understanding of firm operations (see for example, FASB, 2001; Eccles *et al.*, 2001; ICAEW, 2003). It is possible that in the context of the growing interest in intellectual capital reporting, regulations may be promulgated in the future. Therefore, an understanding of the relationship between the cost of capital and intellectual capital disclosure can provide an economic basis for evaluating the costs and benefits of enhanced disclosure of intellectual capital information. Understanding the costs and benefits of disclosure is important for the standard-setting process (Leuz and Verrecchia, 2000; Botosan, 2006). The study also provides insights into the categories of intellectual capital disclosures that are likely to be more relevant in influencing the cost of capital, and thus provide managers with insights into which disclosures to focus on. If managers believe a commitment to increased intellectual capital disclosure is

beneficial through a reduction in the cost of capital, they would likely have incentives to improve disclosure of the information type.

The study contributes to the literature in a number of ways. First, it adds to the limited existing body of literature: on the extent of intellectual capital disclosures in annual reports of UK firms (Williams, 2001; Vandemaele *et al.*, 2005; Bozzolan *et al.*, 2005; Unerman *et al.*, 2007); and on the association between voluntary disclosure and cost of capital (Botosan; 1997; Gietzmann and Ireland, 2005; Kristandl and Bontis, 2007). Second, it provides the first evidence on the relationship between the cost of capital and intellectual capital disclosure in the context of the UK. Third, unlike previous studies that examine aggregate disclosure, this study disaggregates disclosure into intellectual capital and financial disclosure and investigates the question of whether intellectual capital disclosure and financial disclosure are independently associated with the cost of equity capital. Disaggregating disclosure into financial and intellectual capital information may reveal valuable additional insights that are likely to be concealed by using aggregate disclosures. In this respect, it contributes to the literature by incorporating in the analysis, an important dimension of the information environment relating to the key value-creating drivers in the firm, and therefore likely to have significant influence on the cost of equity capital. Fourth, the study splits intellectual capital into its three categories and examines whether these categories are independently associated with the cost of capital. This helps the understanding of the key categories of intellectual capital that may be contributing to influencing the cost of capital. Fifth, it explores how intellectual capital interacts with financial disclosure to affect the cost of capital. Investigating the interaction effects of different types of disclosure on the cost of equity capital offers greater insights into the disclosure-cost of capital relationship, and this is another novel feature of this study.

Structure of the report

The rest of the report is structured as follows. Following this introductory chapter, the literature review on intellectual capital reporting is reviewed in chapter two. In chapter three, the literature on the relationship between cost of capital and disclosure is reviewed and discussed. Chapter four describes the research method used. Chapter five presents the descriptive statistics relating to cost of capital of UK firms and the extent of both financial disclosure and intellectual capital disclosure. In chapter six, results of the relationship between disclosure and the cost of equity capital are presented and discussed. Finally, chapter seven presents the concluding remarks, including the implications of the study, the limitations and possible avenues for further research.

2 Intellectual Capital Reporting

Introduction

This chapter reviews the literature on intellectual capital reporting. It highlights the definitions of intellectual capital, the weaknesses of the traditional reporting model and why intellectual capital reporting has become so important in today's economy. Additionally, a brief review of some of the empirical literature on intellectual capital reporting and of the motivations for intellectual capital reporting is provided. The review is important to provide an understanding of the role of intellectual capital reporting as well as the state of intellectual capital reporting. Finally, the chapter closes with a summary and conclusions.

The concept of intellectual capital

A wide range of definitions for intellectual capital have been suggested in the literature. Such definitions vary in focus, from personal attributes, to organisational attributes (Mouritsen, 1998), to knowledge that can be used to create value (Stewart, 1997). Stewart (1997) also views intellectual capital as the sum of everything residing in a company giving rise to competitive edge in the marketplace. CIMA (2001) and Marr and Schiuma (2001) probably provide the most comprehensive definitions when they define intellectual capital as:

> *…the possession of knowledge and experience, professional knowledge and skill, good relationships, and technological capacities, which when applied will give organisations competitive advantage.* (CIMA, 2001, p. 2)

> *…the group of knowledge assets that are attributed to an organisation and most significantly contribute to an improved competitive position of this organisation by adding value to defined key stakeholders.* (Marr and Schiuma, 2001)

A key feature of the definitions of intellectual capital is that they recognise the link between intellectual capital and the structure and performance of an organisation. They reflect the uniqueness of intellectual capital to individual firms in enhancing their competitive advantage.

Whilst there is a wide range of definitions, there seems to be broad consensus that intellectual capital comprises three major categories: human capital, structural capital and relational capital (Guthrie and Petty, 2000; Lev and Zambon, 2003; Boedker *et al*., 2005). This is the classification used in this study (see Appendix one). Human capital is recognised as an important firm resource and is viewed as including training, experience, judgement, intelligence, relationships and insights of individual managers and workers in the firm (Marr and Schiuma, 2001; Marr *et al*., 2004; Sonnier, 2008). It therefore captures the knowledge, professional skills, experience and innovativeness of employees within an organisation. Wright *et al*. (1998) argue that human capital is important because it provides the means by which firms enhance their competitive advantage in the market place. Structural capital consists of the structures and processes employees develop and deploy in order to be productive, effective and innovative (Boedker *et al*., 2005). This includes, for example, patents, organisational culture, management philosophy, new product development, information systems and processes. Relational capital captures the knowledge of market channels, customer and supplier relationships, and governmental or industry networks. Hence, it relates to the organisation's relationships with external stakeholders be they suppliers, customers or others (Guthrie *et al*., 2007; Marr *et al*., 2004).

Intellectual capital reporting and the capital markets

According to Lev and Zambon (2003), economic development in recent years has been characterised by continuous innovation, the spread of digital and communication technologies, the relevance of network forms of organisation, and the prevalence of soft, intangible and human factors. Firms operating in competitive, global markets recognise that the traditional reliance on tangible assets as value drivers, has been supplemented - or even superseded - by softer, intangible asset forms. Hence, for most organisations, intellectual capital is now recognised as an integral part of the firm's value-creating processes (Bukh, 2003; Holland, 2003).

However, whilst intellectual capital is considered a major contributor in the value-creating processes in the firm (Beattie and Thomson, 2007), the costs involved with these intangible assets are either immediately expensed in the financial statements or arbitrarily amortised, and therefore are not adequately reflected in the financial statements. For example, the 'new' intangibles such as employee competencies, customer relationships and computer and administrative systems are not recognised in the traditional financial reporting model. Although regulatory reporting requirements require traditional intangibles such as brand equity, patents and trademarks to be incorporated in the financial accounts, they are only recognised if they meet some stringent criteria (Holland, 2006; Guthrie *et al.*, 2007). Consequently, the book values of firms are poorly related to the market values (Holland, 2003; Beattie and Thomson, 2004). For example, Lev (2001) documents an increase in the mean market-to-book ratio from 1.0 in 1977 to 6.0 in 2000 for the S&P500 firms. Gu and Lev (2004) also show an average market-to-book ratio of 4.5 for the S&P500 firms in the year 2003. Similarly, Beattie and Thomson (2004) reveal that the mean market-to-book value for FTSE 100 firms to be 2.52 for the year 2002/2003. These results indicate a substantial gap between book and market values of firms.

In the light of the evidence on the growing gap between market and book values of firms, it has been argued that the traditional financial reporting model has become of limited relevance to investors because it fails to reflect information about a wide range of value-creating intangible assets (Francis and Schipper, 1999; Lev and Zarowin, 1999; Barsky *et al.*, 2003). The Jenkins Report (AICPA, 1994, p. 80) also suggests that:

> *...a large part of the immediate problem… is the limited usefulness of today's financial statements. They do not, for example, reflect information-age assets, such as information, capacity for innovation, and human resources. As a consequence, they have been a declining proportion of the information inputs to investors' decision making...*

Bukh (2003) argues that the traditional reporting model is not able to cope adequately with the reporting requirements of the new economy firms which rely heavily on investment in intangible assets. This failure by the financial reporting model to reflect investments in intangibles (intellectual capital) has given rise to increasing information asymmetry between firms and users (Rylander *et al.*, 2000; Barth *et al.*, 2001; Holland, 2003) which has increased opportunities for moral hazard, adverse selection and other opportunistic behaviour by managers (Aboody and Lev, 2000; Holland, 2006). Consequently, this has caused concerns within the capital market on the ability and relevance of the accounting numbers reported in the financial reports for making economic decisions (Barth *et al.*, 2001). This has further been exacerbated by post-Enron concerns about the veracity of financial statements and the general downturn in the global economy (Barsky *et al.*, 2003; Guthrie *et al.*, 2007). Eccles and Mavrinac (1995) and Lev (2001) contend that reporting of investments in intellectual capital in the firm is an important way of bridging this information asymmetry gap between managers and outside investors.

Empirical studies of intellectual capital reporting

The increasing importance of intellectual capital for business enterprises in fostering competitive advantage and value, coupled with the perceived limited value-relevance of traditional financial reports has led to increased calls from different constituents for improved intellectual capital reporting by firms in order to support investors' decision-making processes (see for example, Wallman, 1995; FASB, 2001; ICAEW, 2003; Holland, 2006; ASB, 2007). Wallman (1995), for example, contends that:

> *We cannot have financial reporting and disclosure constraints that slow the pace of progress in capital markets, decrease the rate of reduction in the cost of capital, or limit innovation.* (p. 89)

Consistent with this, Beattie (1999, p. 78) calls for firms to report externally on the measurement and management of intellectual capital. Similarly, Beattie and Thomson (2004) argue that the business reporting model needs to expand beyond the traditional financial reporting model in order to accommodate intellectual capital and meet the information needs of the capital market.

Some authors (see for example, Rylander *et al.*, 2000; Abdel-Khalik, 2003) suggest an extension of the balance sheet with complementary balance sheets, or a supplementary set of elements in reporting to acknowledge forms of capital that cannot be measured in financial terms, to recognise intellectual capital in financial reports. However, Cañibano *et al.* (2000) argue that the cost associated with a radical change in the accounting system to make it more value-relevant is unaffordable and that the sensible approach towards the enhancement of financial statements is to encourage voluntary intellectual capital disclosure. This view is shared by others (for example, DATI, 2002; Beattie and Thomson, 2007)

contending that the opportunity to report intellectual capital in narrative format already exists within corporate annual reports.

In response to the increased calls for improved intellectual capital disclosures, the extent to which intellectual capital information is disclosed in annual reports has been examined by a number of studies during the last decade. Such studies have examined the content of the disclosures made by firms with the aim of providing an overview of intellectual capital disclosure practices in annual reports (Guthrie and Petty, 2000; Guthrie *et al.*, 2006, 2007; Unerman *et al.*, 2007) and in certain cases examining the factors influencing intellectual capital disclosures (Bukh *et al.*, 2005; Bozzolan *et al.*, 2005; Li *et al.*, 2008). Generally, the findings of these studies suggest that the level of intellectual capital disclosure is low and variable, but also improving over time. Guthrie and Petty (2000) is one of the early pioneering studies to examine intellectual capital disclosure practices. Employing a checklist developed from Sveiby's (1997) model they show that intellectual capital disclosure by a sample of 20 Australian firms was low. Brennan (2001) follows Guthrie and Petty (2000) and examines annual reports of 11 knowledge-intensive firms in Ireland. The findings reveal that intellectual capital assets were rarely reported in the annual reports. Other studies using similar approach (for example, Bozzolan *et al.*, 2003; April *et al.*, 2003) also show low disclosure of intellectual capital.

In a longitudinal study of the annual reports of 31 FTSE 100 firms, Williams (2001) also documents low, but increasing intellectual capital disclosures. Bukh *et al.* (2005) examine prospectuses of Danish IPOs for the period 1990-2001 rather than annual reports. They show a substantial increasing trend in the disclosure of intellectual capital information over the period. Abeysekera and Guthrie (2005) document similar results. They examined annual reports of the top 30 listed firms in Sri Lanka for the period 1998/1999 and 1999/2000 and observe an increase in intellectual capital disclosure. Similarly, Vandermaele *et al.* (2005) conduct a study of intellectual capital disclosure practices in the

Netherlands, Sweden and UK. They document an increasing trend in all the three countries over the 1998 to 2000 three year period. More recently, Guthrie *et al*. (2007) investigate the intellectual capital reporting practices in Australia, Hong Kong and document low amounts of intellectual capital information in annual reports in both countries. In a UK study, Unerman *et al*. (2007) show substantial intellectual capital disclosures even in sectors in which intellectual capital is not expected to be a significant value driver, such as real estate, retail and utilities.

Motivations for intellectual capital reporting

A number of explanations have been provided in the literature to explain why firms might voluntarily measure and report intellectual capital. Guthrie *et al*. (1999) classify these incentives into those relating to the internal activities of the firm and those relating to the external environment that impacts the firm. From the perspective of the internal environment, measuring and reporting intellectual capital is said to benefit the firm via increased operational efficiency, improved employee morale and motivation, and better resource allocation with the firm (Flamholtz and Main, 1999; Guthrie *et al*., 1999). In the context of the external environment, the overriding incentive for firms to engage in voluntary disclosure of intellectual capital is to 'render the invisible visible' to external users of information (Cooper and Sherer, 1984; Roos and Roos, 1997; Beattie and Thomson, 2007). Reporting intellectual capital provides firms with an opportunity to: (1) establish trustworthiness with stakeholders and employ a valuable marketing tool (Van der Meer-Kooistra and Zijlstra, 2001); (2) enhance external reputation (Toms, 2002; Guthrie *et al*., 2006); and (3) appear legitimate in the public eye and avoid costs from non-legitimacy (Deegan and Unerman, 2006; Beattie and Thomson, 2007). A further benefit of intellectual capital reporting, and the one particularly relevant for this study, is that intellectual capital disclosure reduces information

asymmetry in the capital markets and lowers the cost of capital (Aboody and Lev, 2000; Lev, 2001). This motivation is developed further in the next chapter of the report.

Summary

This chapter reviews the literature on intellectual capital reporting. The concept of intellectual capital includes three categories: human; structural; and relational capital. The reporting of intellectual capital information to the capital market is important because the traditional financial reporting model fails to fully reflect investments in intangible assets (that is intellectual capital), and therefore the value-relevance of financial statements has become limited. Consequently, calls have been made for firms to provide information about investments in intangible assets to enhance investor understanding of the value-creating activities of firms. Responding to these calls, there has been a growing number of studies investigating the extent to which firms report intellectual capital information. A review of these studies suggests that intellectual capital disclosure is generally low and variable, although growing over time. An important finding of these studies is that although low, intellectual capital disclosures are now being made even by firms in sectors in which intellectual capital is not expected to be a significant value driver, such as real estate, retail and utilities. One of the incentives for reporting intellectual capital by firms is to 'make the invisible visible' thereby reducing information asymmetries between the firm and investors and lowering the cost of capital.

3 Disclosure and the Cost of Capital

Introduction

The literature review in the previous chapter shows intellectual capital reporting is still low and variable, but increasing over time. One of the motivations for reporting intellectual capital is to lower the cost of capital via a reduction in information asymmetry. This chapter reviews the literature on the cost of capital and intellectual capital disclosure to provide insights into the gaps that the current study addresses as well as opening avenues of future research. First, the theoretical literature underpinning the relationship between the cost of capital and disclosure is discussed. This is followed by a discussion of the empirical studies of the relationship between the cost of capital and disclosure, including some on intellectual capital disclosure. Finally, a summary is presented.

Theoretical literature of disclosure and cost of capital

The notion of the link between disclosure and a firm's cost of capital is supported by two related streams of theoretical literature (see Botosan, 1997). The basic assumption of these streams of the literature is that firms which provide more information about their activities reduce information asymmetry in the capital markets. One stream argues that an environment of information asymmetry introduces adverse selection into the market (Diamond and Verrecchia, 1991; Handa and Linn, 1993). Welker (1995) points out that such adverse selection leads to a reluctance by uninformed investors to trade shares in order to 'price protect' against potential losses from trading with other better informed market participants. This reluctance to trade reduces market liquidity in

the firm's shares (Amihud and Mendelson, 1986; Welker, 1995; Handa and Linn, 1993). In this respect, firms that wish to raise capital will be forced to issue shares at a higher discount because investors pay less for shares with high transaction costs (Botosan, 2006). Consequently, the share issue proceeds will be lower. Handa and Linn (1993) argue that firms can lower the discount at which their shares are issued by improving disclosure to reduce information asymmetries arising either between the firm and outside investors or between buyers and sellers of the firm's shares. Amihud and Mendelson (1986) also suggest that firms with larger bid-ask spreads have higher cost of capital, and by disclosing more information they reduce the bid-ask spreads. Similarly, Diamond and Verrecchia (1991) and Easley and O'Hara (2004) contend that by improving disclosure, firms enhance the liquidity of their shares thereby attracting increased demand for the shares, which increases share prices. Bloomfield and Wilks (2000), in their experimental study, also document that greater disclosure of information about the firm leads investors to trade shares at relatively higher prices, hence providing greater liquidity of the firm's shares.

The second stream of the literature suggests that greater disclosure results in a reduction of the estimation risk associated with investors' assessments of a share's return or payoff distribution (Botosan, 2006). The logic is that because investors estimate the parameters of return on a firm's share on the basis of available information, an increase in disclosure allows investors to better estimate share returns. This consequently lowers the required rate of return (Barry and Brown, 1985; Handa and Linn, 1993; Coles *et al.*, 1995). Barry and Brown (1985) document support for this argument by modelling the premium that investors demand for bearing information risk in an environment of information asymmetry. They show that shares for which relatively little information exists have relatively higher systematic risk (or non-diversifiable risk). Handa and Linn (1993) also show, using the Arbitrage Pricing Model that an investor attributes more systematic risk to shares with low information than to

shares with high information leading to lower demand and prices for the shares. Lambert *et al.* (2007) consider the quality of information as important in aligning firms and investors with respect to capital investments. They argue that higher information quality affects not only investors' perception of a firm's future cash flows, but also enables investors to affect the firm's real decisions and future cash flows. This lowers the information risk premium resulting in lower expected return by investors. In summary, firms increasing disclosure reduce the required rate of return demanded by uninformed investors due to their uncertainty about the firm and this reduces the cost of capital.

In today's competitive environment, where intellectual capital plays a key role in the value-creating processes and activities of the firm (Bukh *et al.*, 2005; Holland, 2006; Beattie and Thomson, 2007), the logic of these two streams of theoretical literature are particularly relevant for intellectual capital reporting. As Aboody and Lev (2000) argue, the extent of information asymmetry between firms and investors for investments in intellectual capital is greater than that associated with other types of investments (physical and financial assets). Empirical evidence is consistent with this notion. For example, Barth *et al.* (2001) show that analyst coverage is significantly higher for firms with intensive investments in research and developments. The main reason for this is that intellectual capital is more unique to a particular firm compared to physical and financial assets (Aboody and Lev, 2000) and contrary to investments in physical and financial assets, intellectual capital reporting is not regulated. Francis and Schipper (1999) argue that this is compounded by the fact that accounting measurement and reporting rules mandate that most investments in intellectual capital are immediately expensed in the period in which they are incurred. Hence most investments in intellectual capital are not fully reported in the firm's financial statements. Consequently, whilst investors are regularly informed about changes in physical and financial assets via mandated annual and interim reports, there is relatively scarce public information

about intellectual capital investments. This creates a complication for investors when undertaking firm valuation because they have little or no information about the productivity and value changes of intellectual capital investments (Barth *et al.*, 2001; Lev, 2001).

In the context of the above, Lev (2001) posits that the reporting of intellectual capital should result in a lower cost of capital. Disclosing information about intellectual capital investments provides investors with a more forward-looking view of the firm (Williams, 2001; Beattie and Thomson, 2007; Guthrie *et al.*, 2007). This improves the market's understanding of a firm's value-creating processes and activities as well as the economic risks attached to the firm's shares. Such understanding leads to improvement in capital market efficiency, which reduces the uncertainty premium required by investors when making decisions to invest in a firm (Aboody and Lev, 2000; Lev, 2001). Garcia-Ayuso (2002) also notes that an understanding of investments in intellectual capital by the capital market is likely to reduce stock price volatility and therefore the cost of capital.

In summary, failure to report intellectual capital externally will have the effect that investors will lack information on the development of a firm's intangible resources. This lack of information leads to investors' risk perceptions being higher (Lev, 2001; Healy and Palepu, 2001). The higher risk perception manifests itself in systematic undervaluation of firm's shares by investors (Francis and Schipper, 1999; Lev, 2001). Thus, from a theoretical standpoint, firms improving their disclosure of intellectual capital information can lower their cost of capital by reducing information asymmetry (Diamond and Verrecchia, 1991) and lowering information risk (Handa and Linn, 1993; Verrecchia, 2001).

Empirical studies of disclosure and cost of capital

Drawing from the above theoretical literature, a number of studies have examined empirically the relationship between the cost of capital

and different disclosure types. Examples of disclosure types include: aggregate disclosure (Botosan, 1997; Hail, 2002); social disclosures (Richardson and Welker, 2001); timely disclosures (Botosan and Plumlee, 2002; Gietzmann and Ireland, 2005); and more recently, intellectual capital disclosures (Singh and Van der Zahn, 2007; Kristandl and Bontis, 2007). These studies are discussed in the following sections.

Voluntary disclosure and the cost of capital

Botosan (1997) was the first to empirically explore the relationship between the cost of capital and aggregate disclosure in 122 firms operating in the machinery manufacturing industry. She documents a negative relationship between the cost of capital and disclosure for firms with a lower analyst following. The analysis indicates that firms with greater disclosure could reduce their cost of capital by about 2% relative to firms with lower disclosure. In contrast, Botosan (1997) shows no relationship between disclosure and the cost of capital for firms with high analyst following. She suggests that this could be because public disclosures play a more significant role in the communication process for firms with low than high analyst following. Hail (2002) also investigates a sample of 73 Swiss firms to determine whether they reduce their cost of capital by increased annual voluntary disclosure. Consistent with Botosan (1997), the results show a negative relationship between voluntary disclosure and the cost of capital. Hail (2002) reveals that high-disclosing firms enjoy about 1.8% to 2.4% cost advantage over low-disclosing firms. Francis *et al*. (2005) extend the investigation to an international setting. Using a sample of firms from 34 countries, they also document that firms with greater external financing needs disclose more information and that such expanded disclosure lowers their cost of capital.

In an extension of Botosan (1997), Richardson and Welker (2001) examine the impact of two types of disclosure (social and financial disclosures) on the cost of capital in Canadian firms. Whilst, they

document a negative relationship between the cost of capital and financial disclosures, they find a positive relationship with social disclosures, suggesting that firms that disclose greater social information are penalised by the market. They suggest that this could be a result of: (1) biases in social reporting with firms experiencing higher social costs disclosing more positive than negative information for self-promotion; (2) the market holding different views on the pay-offs of investments in social responsibility; or (3) the type of data used which was collected in a period of recession. Botosan and Plumlee (2002) also extend Botosan's (1997) study and explore the relationship between cost of capital and annual report disclosures, timely disclosures (quarterly and other published reports), and investor relations activities. Whilst they also document that the cost of capital decreases with increased annual financial disclosures, their findings show that the relationship between the cost of capital and timely disclosures is positive. Further analysis shows that firms providing greater timely disclosures have a cost of capital which is about 1.3 percentage points higher relative to firms providing lower levels of timely disclosures. Botosan and Plumlee (2002) suggest that timely disclosures may increase volatility of share prices and hence increase the cost of capital because they attract transient investors who trade aggressively on short-term earnings. In terms of investor relations disclosures, Botosan and Plumlee (2002) find no evidence of an association between the cost of capital and investor relations activities.

Gietzmann and Ireland (2005) criticise Botosan and Plumlee's (2002) study arguing that the positive relationship documented for timely disclosures derives from an inappropriate measure of timely disclosure. They argue that using quarterly disclosures can only provide a partial picture of events in a firm. In a UK context, they developed their measure of quality (rather than quantity) timely disclosures from the Regulatory News Service (RNS) of the London Stock Exchange, where firms are required to make disclosures of any price sensitive information. They document that timely disclosures are negatively related to the cost

of capital for firms with aggressive accounting policies than for those with conservative accounting policies. In a more recent study, Espinosa and Trombetta (2007) also document a negative relationship between disclosure and cost of capital for firms with aggressive accounting policy.

Whilst the above studies attempt to measure both disclosure and cost of capital in a somewhat direct way, others employ proxy measures of either the cost of capital or disclosure. For example, Welker (1995) employs analyst ratings of overall disclosure policy and demonstrates that firms with higher disclosure ratings have, on average, lower bid-ask spreads (an indirect cost of capital measure). Similarly, Leuz and Verrecchia (2000) investigate the consequences of commitments to increased disclosures. They find that German firms switching from local GAAP to IFRS or US GAAP (their measure of commitment to increased disclosure) have lower bid-ask spreads. Cuijpers and Buijink (2005) also find similar results, but only for those with greater analyst following, whilst Daske (2006) fails to find evidence of a reduction in cost of capital for German firms switching from local GAAP to IFRS/US GAAP.

Intellectual capital disclosure and the cost of capital

Except for two recent studies by Singh and Van der Zahn (2007) and Kristandl and Bontis (2007), to date no other study has explicitly considered the cost of capital effects of information asymmetry of investments in intellectual capital. Indeed the results of these two studies suggest that the relationship between intellectual capital and the cost of capital is not clear, thus warranting further research on this issue. Singh and Van der Zahn (2007) examine the association between underpricing and intellectual capital disclosures amongst Singapore initial public offerings (IPOs). Contrary to theoretical predictions, they find a positive association between underpricing and the extent of intellectual capital disclosure. However, this study uses under-pricing in IPOs rather than

the cost of capital directly, and therefore, it is difficult to conclude that intellectual capital information influences the cost of capital. In addition, the use of IPO firms means that the results may not be applicable to non-IPO firms because by the nature, IPO firms have greater uncertainty and have no track record and therefore their cost of capital is likely to be higher. Kristandl and Bontis (2007) investigate the effects of intellectual capital disclosure on the cost of capital of 95 listed companies in Austria, Germany, Sweden and Denmark. They classify voluntary disclosure into historical information and forward-looking information and find that the cost of capital decreases with forward-looking (intellectual capital) information but increases with historical (financial) information. The problem with the study is that it employs only a limited number of intellectual capital information items and the financial information only includes stock market information. Additionally, the study does not consider the effects of: interacting financial and intellectual capital disclosure; and the individual intellectual capital disclosure categories, on the cost of capital. Another important problem is that the study uses Gebhardt *et al*.'s (2001) model to estimate the cost of equity capital. The Gebhardt *et al*. (2001) model has been criticised for producing cost of capital estimates which are not related to risk in a reasonable manner, thus calling into question their validity as a proxy for the cost of equity capital (see Botosan and Plumlee, 2005; Botosan, 2006).

Although there is little research investigating directly the relationship between the cost of capital and intellectual capital disclosure, a number of studies examine whether specific intellectual capital indicators are positively related to share prices. For, example, it has been documented that share prices are positively associated with capitalised software development costs (Aboody and Lev, 1998), customer satisfaction (Ittner and Larcker, 1998), brand equity (Barth *et al.*, 2001) and estimates of R&D assets (Lev and Sougiannis, 1996). Ely and Waymire (1999) also examine the relationship between intangible assets and share prices under an environment which allows considerable flexibility for managers to

capitalise such assets. They find that the coefficient relating earnings to share prices decreases with the level of capitalised intangibles. They argue that investors may perceive that managers overstate earnings through intangible assets capitalisation. However, they find that when intangibles are reported separately (disaggregated) the relationship between summary balance sheet measures and share prices are strengthened, supporting the view that non-financial information complements financial information. More recently, Dumay and Tull (2007) examine whether the disclosure of elements of intellectual capital through 'price-sensitive' disclosures to the Australian Stock Exchange affects a firm's share prices. They find that such disclosures, particularly internal capital, affect the cumulative abnormal returns of a firm. In general, these studies show that intellectual capital information influences the short-term trading activities of market participants. However, the effect of intellectual capital information on the investors' long-term view of the firm is not well understood.

Summary

This chapter provides a review of the theoretical and empirical literature on the relationship between the cost of capital and disclosure. Whilst the review indicates a consensus from the theoretical literature that disclosure reduces the cost of capital via a reduction in adverse selection and the estimation risk associated with investors' assessment of the return from a firm's share, empirically, the results are generally mixed. Some studies document a negative relationship, while others show a positive relationship and/or no relationship at all. Reasons for these mixed results have included measurement difficulties associated with both cost of capital and disclosure, and the richness in terms of disclosure environments employed in most previous studies (Richardson and Welker, 2001). Second, the results suggest that different types of disclosure have differing effects on the cost of capital. Consequently, Botosan (2006) calls for further research in order to understand more

about the relationship between the cost of capital and disclosure. Hence this study contributes to the debate on the cost of capital effects of information asymmetry by investigating the relationship between the cost of capital and intellectual capital disclosure.

This study differs from previous studies in a number of dimensions. First, unlike previous studies that tend to examine aggregate disclosure, this study discriminates between intellectual capital disclosures and financial disclosures. The decision to distinguish between intellectual capital and financial disclosures derives from the perceived weaknesses in the existing financial reporting model in providing investors with useful information coupled with the perceived importance of intellectual capital information in firm valuations by investors. Investments in intellectual capital are unique to a specific firm and their reporting is unregulated (Aboody and Lev, 2000), thus making the information asymmetry between the firm and investors greater for intellectual capital investments than for physical and financial investments. The distinction therefore allows not only a determination of whether intellectual capital disclosure is independently related to the cost of capital, but also to ascertain its interaction effects with financial disclosures on the cost of capital. It has been suggested that intellectual capital combines and interacts with traditional physical and financial assets to create value in ways which are unique to individual firms. Additionally, previous studies have not examined the independent effects of the three categories of intellectual capital (structural, human and relational) on the cost of capital. As Holland (2003) suggests, the different intellectual capital categories combine and at times interact with each other to create value in terms of known cash flows, and in terms of growing the current business.

Intellectual capital also constitutes an environment in which disclosure is not as rich as other disclosures because of its uniqueness to specific firms and its unregulated nature, thus it provides a basis to differentiate firms in terms of the level of disclosure. Finally, whilst there are studies (Amir and Lev, 1996; Ittner and Larcker, 1998) examining

the relationship between specific intellectual capital indicators and share prices, the current study is different because it instead focuses on the cost of capital and thus reflects the long-term effects of intellectual capital on the firm (Christensen *et al.*, 2007). While share price studies consider the short-term price response to firm news via the identification of the event days and assumes that there has been no leakage of news to the market, cost of capital studies are not sensitive to the identification of specific event dates, and do not assume non-leakage of news to the market (Christensen *et al.*, 2007).

4 Research Method

Introduction

The main objective of this study is to investigate whether firms that publish greater intellectual capital disclosures benefit in terms of a lower cost of equity capital. In this chapter, the research methods used to address this objective are described. First, the selection process of the sample of listed firms examined in the study is discussed, followed by a description of the process by which the main data for the analysis is collected. This includes a discussion of how intellectual capital disclosure, voluntary financial disclosure and the cost of equity capital measures are determined. Finally, the chapter closes with a summary.

Sample selection

The data used in the analysis is obtained from I/B/E/S Datastream as well as from the annual reports of a sample of 126 UK firms listed on the London Stock Exchange (LSE). The selection of these firms is as follows. As at March 2008, there were 3,285 firms fully listed on the LSE. From this list, all overseas firms, Alternative Investment Market (AIM) listed firms and recently listed firms were excluded from the sample. The resultant population size was 522 firms distributed in 15 consolidated industry groupings (see column one of Table 4.1). To select the sample firms for the study, proportionate stratified sampling was applied (Moser and Kalton, 1996). In this respect, the sampling was systematically conducted on an industry basis by selecting one firm from every three firms. The resultant sample was 163 firms (see column two of Table 4.1).

Since the cost of equity capital estimates are computed using data provided by I/B/E/S Datastream, the list of the 163 firms was submitted to Thomson's Datastream for the requisite data. Following this procedure, 16 firms were eliminated from the final sample because of missing or insufficient data from Datastream. A further 21 firms were eliminated because the data failed to meet some of the restrictions imposed by the formula used to compute the cost of equity capital (see discussion on measurement of cost of capital below). This resulted in a sample of 126 firms for use in this study (see column three of Table 4.1). Table 4.1 provides the breakdown of the final sample by industry classification.

Table 4.1 Sample composition by industry

	Population size	Initial sample size	Final sample size	
Industry	**No.**	**No.**	**No.**	**%**
Biotechnology and pharmaceuticals	40	13	10	7.9
Information technology	60	19	13	10.3
Media and publishing	45	14	12	9.5
Business service providers	83	26	22	17.4
Telecommunications services	18	6	6	4.8
Banks and insurance	51	15	14	11.1
Food and beverages	22	7	7	5.6
Electronic and electrical equipment	45	14	5	4.0
Retailing	20	6	6	4.8
Utility	36	11	10	7.9
Engineering	10	3	3	2.4
Aerospace and defence	11	3	3	2.4
Chemicals	29	9	3	2.4
Real estate	40	13	8	6.3
Mining	12	4	4	3.2
Total number of firms	**522**	**163**	**126**	**100.0**

Data collection and variable measurements

Data for the sample of firms was collected from two main sources. For the level of disclosure (both intellectual capital and financial disclosures), the data was collected from the published annual reports for the financial year ends between March 2004 and February 2005. The period was deliberately chosen to reduce the possibility that firm disclosures may have been influenced by the Operating Financial Review (OFR) and the International Financial Reporting Standards (IFRS), which were to become mandatory from period beginning 2005. For measuring the cost of equity capital, the project used share prices and analysts' consensus earnings forecasts provided by Thomson's Datastream. The share price data was collected at the annual release date, whilst the analysts' earnings forecasts are those that were released after the annual report release date. The rationale for this is that analysts would have analysed and incorporated the annual report information into their revised earnings forecasts.

Measuring the level of disclosure

For the purposes of this study, two measures of voluntary disclosure are required: intellectual capital disclosure and financial disclosure. The focus is on voluntary disclosure because most firms provide regulated disclosures, thus regulated disclosures would not differentiate firms in terms of disclosure. Differentiating firms is a necessary criterion for a study of this nature. Whilst the main theme of the study relates to intellectual capital disclosure, financial disclosures are also measured to allow for investigating whether intellectual capital disclosures interact with financial disclosures to affect the cost of capital.

In order to measure the level of both intellectual capital and financial disclosures, this research project uses the annual report as the source of data. It is the main channel by which firms communicate with investors

and other stakeholders (Gray *et al.*, 2005; Bozzolan *et al.*, 2003; Guthrie *et al.*, 2007) and firms use it as a public relations document (Guthrie *et al.*, 2007). In the context of the capital market, and therefore this study, it has been shown in the literature that the annual report is used by investors. For example, Eng and Teo (2000) provide evidence to suggest that analysts revise their earnings forecasts after the release of annual reports suggesting that they provide additional information to analysts. Hope (2003) also shows that annual report disclosure levels are positively related to the accuracy of analysts' earnings forecasts suggesting that the annual report provides useful information to analysts.

Disclosure of both intellectual capital and financial information is measured using a disclosure index developed from a content analysis of annual reports. The approach implemented in this study involves the use of a dichotomous procedure, where a particular information item is awarded one (for yes) and zero (for no) if it is disclosed or not disclosed, respectively. The level of disclosure for each firm is then calculated as an index by dividing the sum of disclosures (all the ones) by the total number of items scored (total count of all the ones and zeros).

In using the disclosure index approach, it is first necessary to develop a checklist of items of information that firms disclose or may disclose (Marston and Shrives, 1991). In this study, a checklist comprising both intellectual capital and financial disclosure items was developed. The items of intellectual capital information were all drawn from Li *et al.* (2008). Li *et al.* (2008) developed the most comprehensive list of intellectual capital information comprising 61 items from a review of several previous studies (such as Guthrie and Petty, 2000; Bozzolan *et al.*, 2003; Beattie and Thomson, 2004) as well as statements of best practice. In line with previous research (see Guthrie *et al.*, 2007; Li *et al.*, 2008; Sonnier, 2008) and the objectives of this study, the intellectual capital disclosure items were divided into human intellectual capital, structural intellectual capital and relational intellectual capital.

For the financial disclosures, the list of items drew heavily from Gray *et al*. (1995) who also presented the most comprehensive list of disclosure items. Given that the items of information required for this study are voluntary in nature, Gray *et al*.'s (1995) list was adjusted to take account of any mandatory items as well as to remove intellectual capital items in the list of financial disclosure. This resulted in a list of 35 main financial disclosure items for the study. The final total list (both intellectual capital and financial) of items in the checklist comprised 96 items. The final checklist is included in Appendix one.

Measurement of cost of equity capital

In this study, the focus is on the cost of equity capital, rather than the cost of debt, because firms in the UK primarily use equity financing (Lee *et al*., 2006). The cost of equity capital is a measure of the discount rate that the market applies to a firm's expected future cash flows to determine the current stock price (Botosan and Plumlee, 2005; Botosan, 2006; Lee *et al*., 2006).

There are a number of alternative methods that have been developed in the literature to estimate the cost of equity capital. Botosan (2006) classifies these into two classes. One class of methods, such as the Capital Asset Pricing Model (CAPM), uses predetermined priced risk factors to yield cost of equity capital estimates. However, Botosan (2006) argues that CAPM based estimates are not useful for investigating the relationship between disclosure and the cost of equity capital because they do not clearly provide for the role of information.

The second class of methods estimates the cost of equity capital by calculating the internal rate of return that equates the market's expectation of future cash flows to current stock price. The main methods in this class are: (1) the residual income (RIV) model (Gebhardt *et al*., 2001); (2) the abnormal earnings growth (AEG) model (Gode and Mohanram, 2003); and (3) the price-earnings growth (PEG) model (Easton, 2004).

All these methods make use of current share price and analysts' forecasts of earnings in estimating the cost of equity capital and therefore are suitable for this study of the relationship between cost of equity capital and disclosure. This is because in making earnings forecasts, analysts use available information about the firm (Lee *et al.*, 2006).

The choice of the method to use depends on the application (Lee *et al.*, 2006) and data availability (Gietzmann and Ireland, 2005). In the context of research on the disclosure-cost of capital relationship, Cooper (2006) argues that the method used should not have a significant impact on the results. He argues that it is the relative differences in the cost of capital estimates among firms, rather than the accuracy of the absolute measures of the cost of capital that matters. This study uses the PEG model as developed by Easton (2004) (see Appendix two for further details).

There are a number of reasons for adopting the PEG model to estimate the cost of equity capital in this study. First, the method has less onerous data requirements, and only requires I/B/E/S data on price and earnings growth to compute the cost of capital. The second reason for using the PEG model is that some studies (Botosan and Plumlee, 2005; Easton and Monahan, 2005) indicate that the cost of capital estimates obtainable from the three alternative approaches (RIV, AEG and PEG) are fairly similar and positively correlated, but the PEG model dominates the other approaches. Additionally, Chen *et al.* (2004) also show in an international setting that the RIV model performs poorly in European countries, and that the AEG model is either inferior to, or equivalent with, the PEG model in all countries. Finally, using the PEG model enables comparison of the estimates with those obtained by Lee *et al.* (2006) who also used the PEG model to compare the cost of capital of UK and European firms.

Under the PEG model approach, the cost of equity capital is defined as the square root of the inverse of the price-earnings growth ratio as follows:

$$r_{PEG} = \sqrt{\frac{eps_2 - eps_1}{P_0}}$$

Where:

r_{PEG}	=	Cost of equity capital of the firm
eps_2	=	Mean value of all two-year-ahead analysts' consensus earnings forecast after annual report release date
eps_1	=	Mean value of all one-year-ahead analysts' consensus earnings forecast after annual report release date
P_0	=	Share price at annual report release date (time = 0)

The mean value of all one-year-ahead (eps_1) and two-year-ahead (eps_2) analysts' earnings forecasts used for this study are those released after the annual report publication date. The rationale for using forecasts made after the release of the annual report is that they potentially reflect the information disclosed in the annual report. The share price (P_0) is at the annual release date. To calculate the cost of equity capital, consider for example, a firm with one-year-ahead and two-year-ahead earnings forecasts of 24.58p and 27.43p, respectively, and a share price of 478.5p at the annual release date. The cost of equity capital for the firm will be the square root of (27.43-24.58)/478.5, equalling 0.077176. So the cost of equity capital will be approximately 7.72% for this firm. It is important to note that to compute the cost of equity capital under the PEG model, the sample firms must have positive one-year-ahead and two-year-ahead consensus analysts' earnings forecasts (see Easton, 2004; Francis *et al.*, 2005; Lee *et al.*, 2006). Additionally, the two-year-ahead analysts' forecasts must be greater than the one-year-ahead analysts' forecasts. This is a limitation of the PEG model because it biases the sample towards stable and less risky firms (Lee *et al.*, 2006) and therefore may influence the results. Given these restrictions and

also missing data, the sample for the study was reduced from 163 to 126 firms (see Table 4.1).

Summary

This chapter outlines the research methods for the research project. The study uses data from a sample of 126 UK firms listed on the LSE. The process by which the level of voluntary disclosure for both intellectual capital and financial information was measured is described. The disclosure index, which is a well established approach that uses a dichotomous procedure to score the annual report is explained and its use is justified. The chapter also discusses the use of the PEG model, developed by Easton (2004), to estimate the cost of equity capital. Analysts' earnings forecasts and share prices are provided by Datastream.

5 Measures of Disclosure and Cost of Capital

Introduction

The previous chapter describes the research methods used to collect data for this study. This chapter presents the results of analysing disclosure and cost of capital data. First, the characteristics of the sample firms are described. Second, descriptive statistics for intellectual capital disclosures, financial disclosures and the cost of equity capital are presented. Finally, a summary concludes the chapter.

Characteristics of sample firms in the study

The firm characteristics used to describe the sample are market capitalisation (firm size), beta (market risk), leverage (financial risk, measured as total debt to total assets), and market-to-book values (growth potential). The data for these characteristics are drawn from the annual reports and the Risk Measurement Service Report published by the London Business School. The statistics are presented in Table 5.1.

Table 5.1 Characteristics of sample firms

Firm characteristics	Mean	Median	Std dev	25th Quartile	75th Quartile
Market value (£ million)	6,007.73	660.45	15,236.95	164.60	3,094.50
Beta	0.997	1.1015	0.306	0.783	1.233
Leverage	0.196	0.148	0.192	0.063	0.283
Market-to-book	1.874	2.412	29.996	1.441	3.660

Table 5.1 shows that the average firm size, measured in terms of the market capitalisation, is about £6 billion. The market capitalisation of firms in the upper (75th) and lower (25th) quartiles are £3.1 billion and £164.6 million, respectively. The median market capitalisation is smaller than the mean at £660 million, but significantly higher than that of the lower quartile firms. This suggests that the sample of firms also includes medium-sized firms. The table also reveals that BETA, a measure of risk for the sample of firms in the study, is 0.997. Firms in the upper and lower quartile have BETA estimates of 0.783 and 1.233, respectively. The median of 1.015 is slightly greater than the mean suggesting that the sample includes some high risk firms.

The mean leverage of the firms is about 19.6% consistent with the notion that UK firms generally do not rely heavily on debt financing (Lee *et al.*, 2006). The median, lower quartile and upper quartile are respectively 14.8%, 6.3% and 28.3%. The fact that the median is lower than the mean indicates that the sample includes low and medium-geared firms. Overall, firms in the sample are lowly geared consistent with the notion that UK firms rely more on equity capital than on debt (Lee *et al.*, 2006). In terms of the market-to-book ratio, the mean is 1.874 which is lower than the 2.52 reported by Beattie and Thomson (2004), although the median of 2.412 is consistent. The reason for this different may derive from the fact that Beattie and Thomson (2004) only examined firms in the FTSE 100 rather than a range of listed firms.

On the whole these statistics show that the sample of firms varies significantly in terms of risk, size, debt, and market-to-book values (variations as measured by the standard deviations). This variation suggests that the sample of firms in the study cover a wide range of firms and therefore the results can potentially be generalised. However, in generalising the results, there is a need to be cognisant of the fact that due to data restrictions imposed by the PEG model, some firms were excluded in the analysis.

Summary descriptive statistics for the disclosure scores

The disclosure scores are analysed at the overall and intellectual capital category disclosure levels as well as according to industry and firm size. This is to help provide a better understanding of firms' disclosure practices. The summary descriptive statistics are presented in Table 5.2.

Table 5.2 Summary of disclosure scores for the sample

Panel A: Disclosure scores					
	Intellectual capital disclosure				
Statistics	**Overall intellectual capital %**	**Human intellectual capital %**	**Structural intellectual capital %**	**Relational intellectual capital %**	**Voluntary financial disclosure %**
Mean	70.1	74.6	73.7	62.3	46.2
Median	72.1	77.3	72.2	61.9	46.4
Std dev	11.5	11.3	14.2	15.8	9.5
25th Quartile	62.3	68.2	66.7	52.4	38.4
75th Quartile	78.7	81.8	83.3	72.6	53.9

Panel B: Distribution of disclosure scores										
	Overall intellectual capital		**Human intellectual capital**		**Structural intellectual capital**		**Relational intellectual capital**		**Voluntary financial disclosure**	
Score range	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Under 20%	0	0.0	0	0.0	0	0.0	1	0.8	0	0.0
20% to <40%	1	0.8	0	0.0	3	2.4	10	7.9	41	32.5
40% to <60%	24	19.1	15	11.9	14	11.1	45	35.7	75	59.5
60% to <80%	74	58.7	64	50.8	64	50.8	48	38.1	10	8.0
80% to 100%	27	21.4	47	37.3	45	35.7	22	17.5	0	0.0
Total	126	100.0	126	100.0	126	100.0	126	100.0	126	100.0

In general, the table indicates, contrary to other previous studies (Guthrie *et al.*, 2007; White *et al.*, 2007; Unerman *et al.*, 2007), extensive disclosure of intellectual capital information in the annual reports of UK listed firms. The extensive intellectual capital disclosures reported in this study, compared to findings of previous studies (such as Guthrie *et al.*, 2007; White *et al.*, 2007; Unerman *et al.*, 2007) may derive from the different times of the research. The data for this study is for the financial year periods 2004 and 2005; whist Unerman *et al.*'s (2007) data set was collected prior to 2004. In this context, it may be argued that the extensive intellectual capital disclosure was a response to the Operating and Financial Review (OFR) which was originally to become mandatory from April 2005.

Panel A of Table 5.2 suggests that firms' disclosures are generally consistent across all three categories of intellectual capital. The overall intellectual capital disclosure mean of 70.1% is generally similar to the mean rating of each of the intellectual capital categories. These results are supported by the high level of correlations among the three intellectual capital categories. The Spearman correlations between human and structural intellectual capital, human and relational intellectual capital and, relational and structural intellectual capital are 0.560, 0.481 and 0.637, respectively, and are highly significant (at 1% level or better). However, as argued by Lang and Lundholm (1993), the fact that these correlations, although high, are less than one, suggests that these categories capture different aspects of a firm's intellectual capital information.

Whilst the means of human intellectual capital and structural intellectual capital are slightly higher than the overall mean score at 74.6% and 73.7% respectively, the mean score for relational intellectual capital disclosure of 62.3% is moderately lower than the overall mean. It would appear that firms provide more disclosures in the human and structural capital categories compared to the relational capital category, suggesting that firms downplay the role of relational capital. This is

puzzling for two reasons. First, in view of increasing global competition, one would have expected relational capital to be equally important and therefore reported as much as other intellectual capital categories. It is possible, however, that firms consider relational intellectual capital competitively sensitive and may be concerned about revealing the information to competitors. Second, Bozzolan *et al*. (2005) and Unerman *et al*. (2007) show, also in the context of the UK, that there is greater disclosure of relational capital information than for human and structural capital information. The reason for the differences between these two studies and the current study may be due to the ways in which disclosure scores were developed. Whilst this study uses a dichotomous approach (one if disclosed; zero if not disclosed), Unerman *et al*. (2007) counted instances of disclosure of an item to reflect the importance the firm attaches to the item.

To gain a clearer picture of the level of intellectual capital reporting, the disclosure scores are grouped into five frequency groups (see Panel B, Table 5.2). As the table shows, most firms (about 80%) disclosed over 60% of the intellectual capital information items included in the study for overall, human and structural intellectual capital. The percentage of firms disclosing over 60% of items reduces to about 55% in the relational intellectual capital category.

Table 5.2 also compares the level of intellectual capital disclosures and financial disclosures. The mean financial disclosure score of 46.2% is lower than for each of the intellectual capital disclosure scores. This is surprising given that firms have been reporting financial information for many years. There are at least three possible explanations for these results. First, the approach used in this study to measure disclosure uses a dichotomous approach which does not take account of the details provided for each intellectual capital item disclosed. Hence a firm that provides more detail about a specific item receives the same score as a firm that just mentions the item without necessarily providing details. This might have distorted the resultant disclosure scores. Second, the

annual reports for this study were published in 2004 and 2005 and this was the time when the eventually repealed regulations for a mandatory Operating and Financial Review (OFR) were to be introduced. Given that the OFR is a heavily intellectual capital related document, it is possible that firms were already responding to forthcoming regulations. This logic is consistent with Gray and Roberts (1989) who show that UK firms anticipate changes in reporting requirements, and respond to such changes in their reporting practices. Third, it is also possible that firms understand the limitations of financial information, and are aware that investors benefit more from intellectual capital information than financial information. Finally, only voluntary financial disclosures are considered and therefore firms that disclose greater mandatory and less voluntary disclosures are penalised.

Analysis of disclosure scores by industry

Previous studies have shown that intellectual capital disclosure varies with industry (Bozzolan *et al.*, 2005; Guthrie *et al.*, 2007; Sonnier, 2008). The results for industry analysis are presented in Table 5.3. Panel A of Table 5.3 indicates disclosure scores for each of the individual industries. An analysis of Panel A indicates high intellectual capital disclosure scores in banks and insurance, telecommunications services, media and publishing, biotech and pharmaceuticals, IT, aerospace and defence, business service providers and food and beverages. This is expected because these industries are generally knowledge-based industries and are more likely to have more intellectual capital information to report.

Table 5.3 Descriptive disclosure scores by industry

Panel A: Analysis of disclosures by individual industry (mean scores)					
Industry	**Overall intellectual capital %**	**Human intellectual capital %**	**Structural intellectual capital %**	**Relational intellectual capital %**	**Voluntary financial disclosure %**
Banks and insurance	75.3	77.9	76.6	71.4	45.6
Telecommunications services	72.7	71.9	75.0	71.4	48.9
Media and publishing	72.7	75.4	75.0	67.9	47.2
Biotech and Pharmaceuticals	71.8	74.1	73.9	67.6	48.5
IT	71.2	75.5	70.9	67.0	41.5
Aerospace and defence	70.5	66.7	79.6	66.7	54.9
Business service providers	70.1	75.8	73.9	61.0	43.4
Food and beverages	70.0	72.1	81.7	57.8	49.2
Engineering	69.9	72.0	75.0	63.5	48.9
Mining	69.9	75.8	72.2	61.9	51.8
Chemicals	68.8	75.8	81.5	50.8	41.9
Electronic and electrical equipment	67.9	74.5	77.8	52.4	44.7
Real estate	66.8	73.9	63.9	61.9	52.7
Utility	64.6	76.6	71.4	46.3	45.1
Retailing	62.1	71.5	64.1	50.6	46.1

Table 5.3 Descriptive disclosure scores by industry (Cont)

Panel B: Analysis of disclosure scores by sector groupings					
	Overall intellectual capital %	**Human intellectual capital %**	**Structural intellectual capital %**	**Relational intellectual capital %**	**Voluntary financial disclosure %**
Non-intellectual capital intensive sectors (N=38)					
Mean	66.4	73.2	71.1	55.3	48.1
Median	68.1	77.3	72.2	57.1	50.0
Std dev	12.3	11.5	17.4	14.2	07.9
25th Quartile	59.0	67.0	61.1	47.6	40.5
75th Quartile	77.0	81.8	88.9	63.1	54.3
Intellectual capital intensive sectors (N=88)					
Mean	71.7	75.2	74.8	65.3	45.4
Median	72.9	77.3	77.8	66.7	44.7
Std dev	10.9	11.2	12.5	15.6	10.0
25th Quartile	62.2	68.2	66.7	52.4	38.2
75th Quartile	80.3	81.8	83.3	76.2	53.9
T-tests Statistics	-2.407**	-0.914	-1.368	-3.404***	-1.492

*** Significant at the 1% level
** Significant at the 5% level

Bozzolan *et al*. (2005) compare the intellectual capital disclosure practices of 'traditional' and 'knowledge-intensive' sectors and show that intellectual capital disclosure differs by this sector classification. Unerman *et al*. (2007) also emphasise the importance of industrial sector to the pattern of intellectual capital disclosure practices. Therefore, in Panel B, the industries are grouped into intellectual capital-intensive (knowledge-intensive) sectors and non-intellectual capital intensive (traditional) sectors. The industry sectors that were classified as intellectual capital intensive are biotech and pharmaceuticals, IT,

business service providers, telecommunications, banks and insurance, media and publishing, aerospace and defence, chemicals, and electronic and electrical equipment. The remaining industries, real estate, mining, retailing, engineering, food and beverages and utility were classified as non-intellectual capital intensive sectors. Firms in intellectual capital intensive sectors are more likely to be heavily reliant on intellectual capital than non-intellectual capital intensive sectors (Amir and Lev, 1996; Barth *et al.*, 2001; Bukh *et al.*, 2005) and therefore likely to disclose more intellectual capital information.

Consistent with Bozzolan *et al.* (2005) and Unerman *et al.* (2007), the resultant analysis appears to show that firms in intellectual capital intensive sectors provide greater levels of intellectual capital disclosure than firms in non-intellectual capital intensive sectors. The mean overall intellectual capital disclosure for intellectual capital intensive sectors is 71.7% which is higher than the 66.4% for non-intellectual capital intensive sectors. Similarly, intellectual capital intensive sectors seem to provide higher disclosures in the three intellectual capital categories than do non-intellectual capital intensive sectors. However, whilst the intellectual capital scores are significantly different between intellectual capital intensive and non-intellectual capital intensive sectors for overall intellectual capital (at 5% level or better) and relational intellectual capital disclosures (at 1% level or better), no significant differences are observed between the two sector groupings for human and structural intellectual capital disclosures. This suggests that human and structural intellectual capital are perceived as important in all firms regardless of whether they are in intellectual capital intensive or non-intellectual capital intensive sectors. In this respect, it would seem that all firms consider human capital as important. Wright *et al.* (1998) argue that human capital provides the means by which firms enhance their competitiveness and therefore it is possible that firms may want to showcase their human capital strengths to investors by disclosing more of this information. The significant difference on relational IC disclosure

seems to suggest that relational capital is considered more important by intellectual capital intensive sectors than non-intellectual capital intensive sectors. Guthrie *et al.* (2007) suggest that because these sectors operate in highly competitive environments, with increasingly segmented and fractured markets, relational capital may be viewed as a priority, hence its increased disclosure in these sectors. Another observation from Table 5.3 is that although industries such as utilities, retail and real estate, are not generally expected to rely heavily on knowledge-based assets (Unerman *et al.*, 2007), the level of IC disclosure by these industries seems high. This generally emphasises the importance of intellectual capital in a firm's value generating activities and the desire by firms to inform the market about the existence of these intangible assets.

In terms of voluntary financial disclosure, non-intellectual capital intensive sectors exhibit greater disclosure than intellectual capital intensive sectors, although the difference is not statistically significant. There are two possible reasons for this. First, it may well be that intellectual capital intensive sector firms are motivated to disclose more intellectual capital information and less financial information because of the perceived inadequacies of financial information in enhancing investor understanding of their value-creating capabilities. Second, Barth *et al.* (2001) and Barron *et al.* (2002) show that analyst coverage for firms with greater investments in intellectual capital assets is more than for other firms. An analysis of the study sample reveals that firms in the intensive sectors tend to have higher analyst coverage. Hence the high intellectual capital disclosures may be a response to analyst pressure for intellectual capital information.

Analysis of disclosure scores by firm size

Intellectual capital disclosure studies (Guthrie *et al.*, 2007; White *et al.*, 2007; Li *et al.*, 2008) show that large firms disclose more intellectual capital information. To analyse the firm size effect in this study, firms were classified as large and small using the median market capitalisation

as the cut-off point. Firms with market capitalisation which is higher than the median were classified as large firms and those with market capitalisation lower than the median as small firms. Independent t-tests were undertaken to determine whether there are significant differences between each of the groups. The results of this analysis are in Table 5.4.

Table 5.4 Descriptive disclosure scores by firm size

	Market capitalisation £m	Intellectual capital disclosure				Voluntary financial disclosure %
		Overall intellectual capital %	Human intellectual capital %	Structural intellectual capital %	Relational intellectual capital %	
Low market capitalisation (N=63)						
Mean	219.42	63.0	68.8	67.3	53.3	40.5
Median	164.67	62.3	68.2	66.7	52.4	39.5
Std dev	171.22	10.1	11.7	13.2	13.2	7.5
25th Quartile	88.35	57.4	63.6	61.1	42.9	36.5
75th Quartile	355.38	72.1	77.3	77.8	61.9	46.1
High market capitalisation (N=63)						
Mean	11,796.05	77.2	80.4	80.1	71.3	51.8
Median	3,030.21	77.0	81.8	83.3	71.4	52.6
Std dev	19,998.87	8.1	7.2	12.2	12.9	7.7
25th Quartile	1,635.57	72.1	77.3	72.2	61.9	46.7
75th Quartile	12,534.99	83.6	86.3	88.9	81.0	57.9
T-tests statistics	-4.594***	-8.671***	-6.675***	-5.644***	-7.727***	-8.341***

*** Significant at the 1% level

The results show that, on average, large firms provide greater disclosure than small firms in all disclosure scores. The t-tests for the mean disclosure for all disclosure scores reveal that there is a significant

difference between large and small firms (at 1% level or better). These results are consistent with prior literature of intellectual capital and financial disclosures (see Mangena and Tauringana, 2007; Guthrie *et al.*, 2007; Li *et al.*, 2008). An interesting observation is that human intellectual capital disclosure is generally higher than the other types of disclosures in both large and small firms. This seems to suggest that firms believe that investors are more interested in human capital than other forms of intellectual capital. Large firms, however, seem to disclose significantly high levels of relational capital as in the other two categories. Although still lower than human and structural intellectual capital disclosure scores, the 71.3% disclosure scores compare favourably with the other categories.

Summary descriptive statistics for the cost of equity capital

The previous section presented the results of analysing the reporting of intellectual capital by UK listed firms. In this section, the summary descriptive statistics of the cost of equity capital of the sample firms are presented and discussed. Whilst the analyses of disclosure scores used the full sample of 126 firms, the analyses of cost of capital estimates is based on a reduced sample of 113 firms (see explanation in the next paragraph). Table 5.5 presents the descriptive statistics for the full sample of firms as well as for a reduced sample.

Table 5.5 Descriptive statistics for cost of equity capital

Panel A: Overall measures					
Cost of equity capital	**Mean**	**Median**	**Std dev**	**25th Quartile**	**75th Quartile**
Full sample (%)	9.94	9.02	5.28	7.30	11.31
Reduced sample (%)	10.29	9.28	4.97	7.73	11.59

Panel B: Distribution of cost of equity capital				
	Full sample		**Reduced sample**	
Cost of equity capital	**No**	**%**	**No**	**%**
Under 5%	12	9.5	2	1.8
5% to <10%	66	52.4	65	57.5
10% to <15%	31	24.6	31	27.4
15% to <20%	10	7.9	10	8.9
20% to <25%	5	4.0	5	4.4
25% to <40%	2	1.6	0	0.0
Total	126	100.0	113	100.0

Table 5.5 (Panel A) indicates that the mean cost of equity capital for the full sample of firms is 9.94% which is lower than the 10.48% reported by Lee *et al.* (2006). In the full sample, some of the firms have cost of equity capital as low as 2% and as high as 35.7%. However, Lee *et al.* (2006) show that the risk-free return for UK firms for the years 2004 and 2005 was about 4%, suggesting that the observations of cost of capital that is lower than 4% are outliers. Hence all firms with cost of equity capital below 4% were eliminated. A total of eleven firms from the sectors of business service providers, IT, media and publishing, food and beverages, biotech and pharmaceuticals, real estate and mining were eliminated. Additionally, two firms with cost of equity capital of 28.9%

(from business services providers sector) and 35.7% (from banks and insurance sector) were also removed from the sample. This reduced the sample to 113 firms (all the three mining firms were eliminated) with cost of equity capital ranging from 4.8% to 23.3%. The rationale for eliminating these firms is to reduce the effect of possible outliers, which may influence the cost of equity capital measures calculated (outliers are cases with cost of capital estimates that well above or well below most of the cases). The resultant findings show some changes in the mean cost of capital from 9.94% for the full sample to 10.29% which is closer to the 10.48% reported in Lee *et al*. (2006). The lower and upper quartile cost of capital estimates are 7.73% and 11.59%, respectively. The median of 9.28% is lower than the mean suggesting that for most firms the cost of capital is lower than the mean. Although, the cost of capital estimates obtained using full and reduced sample are similar, the findings reported in this report are based on the reduced sample of 113 firms.

To gain some understanding of the cost of equity capital of UK firms, the estimates for the reduced sample were grouped into six categories (see Table 5.5, Panel B). The distribution of the reduced sample shows that most firms (84.9%) have cost of equity capital ranging from 5% to lower than 15%. Of the remainder, 1.8% of firms have cost of equity capital lower than 5%, 13.3% of firms have cost of equity capital ranging from 15% to lower than 25%.

Table 5.6 Industry cost of equity capital

Panel A: Cost of equity capital by industry (%)					
Industry	**Mean**	**Median**	**Std dev**	**Min**	**Max**
Telecommunications services	13.59	13.01	5.41	6.70	20.80
IT	12.02	9.52	5.71	7.50	23.30
Aerospace and defence	11.50	9.90	4.90	7.60	17.00
Utility	11.29	6.80	7.23	5.00	23.00
Media and publishing	10.46	9.27	3.48	6.50	15.90
Business service providers	10.11	9.27	3.48	6.20	21.00
Banks and insurance	10.05	9.28	3.52	6.70	18.20
Retailing	9.95	8.80	3.04	6.50	14.70
Biotech and pharmaceuticals	9.80	9.28	3.15	6.50	15.20
Electronic and electrical equipment	9.74	10.20	1.35	7.40	10.80
Engineering	9.30	9.00	1.48	7.10	11.30
Food and beverages	9.17	7.72	3.77	5.60	16.20
Chemicals	7.03	7.80	1.42	5.40	7.90
Real estate	6.70	6.80	3.16	4.80	10.30

Panel B: Cost of equity capital (%)						
Intellectual capital intensive vs. non-intellectual capital intensive sectors						
Sector groupings	**Mean**	**Median**	**Std dev**	**25th Quartile**	**75th Quartile**	**t-tests**
Non-intellectual capital intensive sectors (33 firms)	9.68	8.80	4.17	6.85	11.85	
Intellectual capital intensive sectors (80 firms)	10.56	9.35	3.88	7.92	11.72	-1.070

Further analysis is presented in Table 5.6, Panel A and B. In Panel A, the industries are ranked in descending order by their mean cost of equity capital. As the results indicate, telecommunications services, IT, aerospace and defence, utility, media and publishing, business service providers and banks and insurance appear in the top list of sectors with high cost of equity capital, ranging from 10.05% to 13.59%. With the exception of utility, these are classified as intellectual capital intensive sectors (see also Unerman *et al.*, 2007). In Panel B, the industries were classified into intellectual capital intensive and non-intellectual capital intensive sectors using dummies (1 if intellectual capital intensive, and 0 if non-intellectual capital intensive). The results of t-tests show that the non-intellectual capital intensive sectors have lower cost of capital than the intellectual capital intensive sectors, although the difference is not significant. The non-intellectual capital intensive sectors enjoy a 0.88 percentage points (10.56%-9.68%) lower cost of capital relative to the intellectual capital intensive sectors. In their study of cost of capital, Lee *et al.* (2006) also show that some of the industries classified as intellectual capital intensive sectors in this project (such as telecommunications services, IT, media and publishing, business service providers and banks and insurance) have higher equity premiums than the other industries (such as retail). Lee *et al.* (2006) attributes this higher cost of equity capital to greater uncertainty due to high growth, intense competition and shorter product life cycles associated with intellectual capital intensive sectors. It is interesting to note that these sectors were also noted for their high disclosure level of intellectual capital information in this project. It may well be that the high disclosures are an attempt to provide more information to investors and reduce the cost of equity capital.

As noted above, the cost of equity capital for the utility sector of 11.29% appears in the top list of firms with high cost of equity capital. This finding differs significantly from Lee *et al.* (2006). These differences may derive from three reasons. First, Lee *et al.*'s (2006) cost of capital

estimates are based on data collected over an 11-year period, whilst data for this study is cross-sectional. Second, the number of utility firms in this study is only seven, which is not necessarily reflective of the utility sector. Third, although the expectation is that the perceived market risk for utility firms should be lower because the sector is generally stable and low-growth (Lee *et al*., 2006), these firms provide essential services and therefore their operations (and pricing policies) are subject to high public as well as political scrutiny. Consequently, their profit margins are lower and they are also easy targets for regulation and hence investors may demand a higher rate of return. In general, however, the estimates of the cost of equity capital in this study are reasonably consistent with Lee *et al*. (2006). Sectors reported in Lee *et al*. (2006) as having higher equity premiums also generally appear to have higher cost of equity capital in this study.

Summary

This chapter reports the results of analysing disclosure practices and cost of equity capital estimates of UK listed firms. The results show that intellectual capital disclosures by UK listed firms are extensive, and are even greater than voluntary financial disclosures. Firms seem to disclose more human intellectual capital and structural intellectual capital information than relational intellectual capital. The disclosure scores were also analysed according to intellectual capital intensive and non-intellectual capital intensive sector groupings as well as firm size. The results indicate that in general, intellectual capital intensive sectors disclose a greater level of intellectual capital information than do non-intellectual capital intensive sectors across all intellectual capital categories. However, significant differences only exist for overall intellectual capital disclosure and relational intellectual capital disclosure. A comparative analysis of intellectual capital and voluntary financial disclosures suggests that intellectual capital intensive sectors disclose less financial information

than non-intellectual capital intensive sectors, suggesting that financial information may be considered by intellectual capital intensive sectors as of less importance in investor's understanding of their operations. Additional analysis indicates that both intellectual capital and non-intellectual capital intensive sectors disclose equally greater information about their human and structural intellectual capital, whilst firms in the intellectual capital intensive sectors provide significantly higher relational intellectual capital than non-intellectual capital intensive sectors.

The results of analysing the cost of equity capital estimates were also presented. The results indicate that the average cost of equity capital of UK listed firms is about 10.29%. Further analyses show that most UK firms (84.9%) have cost of equity capital ranging between 5% and 15%. Additional analyses of the cost of equity capital by industry suggest that firms in the intellectual capital intensive sectors such as telecommunications service, IT, aerospace and defence, media and publishing, business service providers, and bank and insurance have a higher cost of equity capital than firms in other sectors. On average, the cost of equity capital is 0.88 percentage points higher for firms in intellectual capital intensive sectors than for those in non-intellectual capital intensive sectors. In the context of the results of intellectual capital disclosure and cost of equity analyses in this chapter, the key question to be addressed in the next chapter of this report is whether firms benefit in terms of cost of equity capital by reporting greater intellectual capital information in their annual reports.

6 Association between Intellectual Capital Disclosure and the Cost of Equity Capital

Introduction

Chapter five reports intellectual capital disclosure and the cost of equity capital of UK listed firms. It notes that intellectual capital disclosure in the annual reports of UK listed firms is extensive. The key question that this chapter addresses is whether firms with greater intellectual capital disclosure benefit in terms of a lower cost of equity capital. The chapter is organised in two main sections. The first section presents the findings of simple correlations of the association between the cost of equity capital and intellectual capital disclosures. In the second section, the findings of further analyses, using independent t-tests to help understand the simple correlations of the relationship between cost of equity capital and disclosure, are presented and discussed. Finally, the chapter finishes with a summary.

Correlations of cost of capital and intellectual capital disclosure

This section discusses the results of the correlations between the cost of equity capital and intellectual capital disclosure and financial disclosure. The Spearman correlation results are presented in Table 6.1. A correlation is a measure of the strength and direction of the relationship and ranges between -1 and +1. The negative and positive signs reflect the direction of the relation whilst the strength of the relation is reflected in the absolute value, called the correlation coefficient. A higher correlation coefficient indicates a stronger relationship.

Table 6.1 Spearman correlations of disclosure and cost of equity capital

Variables	Correlation coefficients for cost of equity capital
Intellectual capital disclosure	-0.350***
Human intellectual capital disclosure	-0.319***
Structural intellectual capital disclosure	-0.285***
Relational intellectual capital disclosure	-0.285***
Voluntary financial disclosure	-0.301***
Market capitalisation	-0.198**
Analyst coverage	-0.331***
Market-to-book value	0.059
Leverage	0.111
Beta values	0.214**

*** Significant at the 1% level
** Significant at the 5% level

The correlations indicate that the cost of equity capital is significantly and negatively related to both intellectual capital disclosure and voluntary financial disclosures (at the 1% level or better). The correlation coefficient for intellectual capital disclosure at 0.350 is greater than the 0.301 for financial disclosures. This implies that the cost of equity capital is slightly more associated with intellectual capital disclosures than with financial disclosures. The finding for intellectual capital disclosure confirms the results of Kristandl and Bontis (2007) who also find a negative relationship in a European setting and those of other voluntary disclosure studies (such as Gietzmann and Ireland, 2005). The table also shows that intellectual capital disclosure categories of human intellectual capital, structural intellectual capital and relational intellectual capital disclosures are also significantly and negatively related to the cost of equity capital. It would seem, judging from the size of the

coefficient, that the cost of equity capital has a greater association with human intellectual capital disclosure than with structural and relational intellectual capital disclosures. The size of the coefficients for structural and relational intellectual capital disclosures is the same, suggesting that they may have an equal impact on the cost of equity capital. These findings suggest that investors may condition their beliefs on the return and future cash flows more on the basis of the quality of the firm's human intellectual capital than on structural and relational intellectual capital. Information on human intellectual capital may be considered by investors as important because human capital may be perceived as providing the means by which firms can enhance their competitiveness and performance (Wright *et al.*, 1998). For example, information on such items as the experience and qualifications of key employees is an indication of a firm's competence in enhancing competitive advantage.

In terms of the other factors that are suggested as influencing the cost of equity capital, it is observed, as expected, that firm size (market capitalisation) is significantly and negatively related to the cost of equity capital. BETA, which is a measure of market risk, is significantly and positively related to the cost of equity capital, whilst market-to-book and leverage are not significant. These findings suggest that large firms enjoy a lower cost of equity capital and high beta firms have a higher cost of equity capital, the latter being consistent with asset pricing theory.

Independent t-tests for cost of capital and intellectual capital disclosure

In order to provide some additional insights into the Spearman correlations between the cost of equity capital and the different disclosure scores, the firms were divided into high and low-disclosing firms using the median disclosure as the cut-off point. Firms with disclosures above the median are classified as high-disclosing firms and those below the median as low-disclosing firms. Further, the different forms of disclosures were also interacted (by multiplying two disclosure types) and again using

the median as the cut-off point, firms were classified into high and low disclosure firms (using interacted disclosure scores).

Table 6.2 reports the results of the t-tests for the relationship between cost of equity capital and disclosure scores. The findings in Table 6.2 confirm the correlation results in Table 6.1, thus, firms committing to greater disclosure enjoy a lower cost of equity capital. For all the different types of disclosures, firms classified as high-disclosing seem to enjoy a significantly lower cost of equity capital than low-disclosing firms.

Table 6.2 T-tests of the relation between the cost of equity capital and disclosure

	Disclosure	Cost of capital			
Level of disclosure	**Mean (%)**	**Mean (%)**	**Median (%)**	**Std dev**	**t-tests**
Voluntary financial disclosure					
Low	40.5	10.86	9.28	6.28	
High	51.8	9.01	8.37	3.88	-1.988**
Overall intellectual capital disclosure					
Low	63.0	11.20	9.90	6.03	
High	77.2	8.41	8.05	3.71	-3.044***
Human intellectual capital disclosure					
Low	68.8	10.99	9.52	5.83	
High	80.4	8.15	7.87	3.59	-3.021***
Structural intellectual capital disclosure					
Low	67.3	11.16	10.13	6.23	
High	80.1	8.67	8.08	3.71	-2.720***
Relational intellectual capital disclosure					
Low	53.3	10.94	9.71	6.03	
High	71.4	8.59	8.16	3.71	-2.522**

*** Significant at the 1% level
** Significant at the 5% level

It can be observed from the table that for firms with high overall intellectual capital disclosures, the cost of equity capital is 2.79 percentage points (11.20%-8.41%) lower than for low intellectual capital disclosing firms. Consistent with the results from the Spearman correlation analyses above, firms disclosing more human intellectual capital seem to have a lower cost of equity capital compared to other intellectual capital categories disclosures. The cost of equity capital for firms with greater human intellectual capital disclosure is 8.15% compared to 8.67% or 8.59% for firms with greater disclosure in structural or relational intellectual capital categories, respectively. It can also be observed that the cost of equity capital percentage point benefit of 1.85% (10.86%-9.01%) for disclosing high versus low voluntary financial information is lower than the 2.79% for intellectual capital disclosures. This implies that firms benefit more from lower costs of equity capital when they provide enhanced intellectual capital disclosures than when they provide greater levels of financial disclosures. Another interesting observation is that for low-disclosing firms, the cost of equity capital is higher for intellectual capital disclosures than for financial disclosures. The results indicate that the cost of equity capital of 10.86% for low financial disclosure firms is lower than the 11.20%, 10.99%, 11.16% and 10.94% for firms with low overall, human, structural and relational intellectual capital disclosures, respectively. This seems to suggest that, given the greater value-relevance of intellectual capital disclosure, firms reporting low intellectual capital information are penalised more than firms reporting low financial information.

Disclosure and cost of capital in intellectual capital intensive sectors

In chapter five, the findings of disclosure in Table 5.3 revealed that intellectual capital intensive sector firms have higher intellectual capital disclosures than non-intellectual capital intensive sectors firms. However, it was also documented in Table 5.6 that intellectual capital intensive sectors firms have higher cost of equity capital than non-intellectual

capital intensive sector firms. Therefore, can intellectual capital intensive sector firms lower their cost of equity capital by enhancing intellectual capital disclosure? To address this issue, Table 6.3 presents the results of analysing the 88 intellectual capital intensive sector firms. The firms were split into high and low disclosure firms via the median disclosure scores. Independent t-tests were then carried out to determine whether the difference in the cost of equity capital between high and low-disclosing firms was significant.

Table 6.3 Disclosure and cost of equity capital for intellectual capital intensive sector firms

	Disclosure	Cost of capital			
Level of disclosure	Mean (%)	Mean (%)	Median (%)	Std dev	t-tests
Financial disclosure					
Low	40.5	10.86	9.28	6.28	
High	51.8	9.01	8.37	3.88	-1.914*
Overall intellectual capital disclosure					
Low	62.5	12.12	10.13	6.42	
High	80.9	8.80	9.30	3.73	-2.963***
Human intellectual capital disclosure					
Low	68.4	11.62	9.98	6.21	
High	85.9	8.62	8.27	3.38	-2.577**
Structural intellectual capital disclosure					
Low	67.6	11.23	10.06	6.02	
High	87.9	9.05	8.05	4.02	-1.805*
Relational intellectual capital disclosure					
Low	53.9	11.59	10.13	6.33	
High	80.3	8.98	8.98	3.68	-2.265**

*** Significant at the 1% level
** Significant at the 5% level
* Significant at the 10% level

The results as documented in Table 6.3 are consistent with those reported in Table 6.2 for the full sample of firms. Firms with more disclosures enjoy lower cost of equity capital. For example, for overall intellectual capital disclosure, high-disclosing firms have a mean cost of equity capital of 8.80% compared to 12.12% for low-disclosing firms. The magnitude of the difference in the cost of equity capital is 3.32 percentage points lower for firms with high intellectual capital information disclosure than for low-disclosing firms. This difference is significant at the 1% level, suggesting that investors penalise firms for disclosing low levels of intellectual capital information in annual reports. The fact that the magnitude of the difference in cost of equity capital of 3.32% is greater than the 2.79% documented for the full sample of firms suggests that intellectual capital intensive sector firms benefit more from enhanced intellectual capital disclosures than the other firms.

In terms of the individual intellectual capital category disclosures and financial disclosures, the findings suggest that firms benefit more from disclosing more human intellectual capital information than the other intellectual capital categories. This is consistent with the findings reported in Table 6.2. The magnitude of the difference in cost of equity capital for human intellectual capital information is 3.00% compared to 2.18% and 2.61% for structural intellectual capital and relational intellectual capital information, respectively. However, unlike the results in Table 6.2, firms that are forthcoming in terms of relational intellectual capital information enjoy slightly lower cost of capital than for structural intellectual capital information. This suggests that investors find relational intellectual capital information more useful for intellectual capital intensive sector firms.

Disclosure interaction and the cost of capital

Finally, one of the objectives of this study is to examine whether intellectual capital and financial disclosure interact with each other to influence the cost of equity capital. Pike *et al*. (2000) argue that intellectual capital and financial information interact to influence the valuation of firms, whilst Holland (2003; 2006) suggests that the intellectual capital categories also interact with each other in different ways to create firm value. Similarly, Espinosa and Trombetta (2007) show that disclosure interactions affect the cost of equity capital. To analyse the effects of disclosure interaction, this study computes the product of the different disclosure types (see Espinosa and Trombetta, 2007). Each product (interaction) is then split into high and low interaction based on its median and t-tests are carried out. The findings of this analysis are presented in Table 6.4.

Table 6.4 Disclosure interactions and the cost of equity capital

Disclosure scores	Cost of equity capital			t-tests
	Mean (%)	Median (%)	Std dev	
Overall intellectual capital and voluntary financial				
Low	11.53	10.30	6.06	
High	8.13	8.03	3.46	-3.794***
Human intellectual capital and structural intellectual capital				
Low	11.46	6.29	10.36	
High	8.55	3.68	8.04	-3.194***
Human intellectual capital and relational intellectual capital				
Low	11.55	6.14	10.20	
High	8.32	3.63	8.05	-3.592***
Structural intellectual capital and relational intellectual capital				
Low	11.21	6.28	9.71	
High	8.62	3.58	8.16	-2.852***
Voluntary financial and human intellectual capital				
Low	11.35	6.05	10.20	
High	8.33	3.67	8.04	-3.331***
Voluntary financial and structural intellectual capital				
Low	11.28	6.15	10.25	
High	8.46	3.62	8.03	-3.090***
Voluntary financial and relation intellectual capital				
Low	11.02	6.22	9.71	
High	8.57	3.36	8.24	-2.652***

*** Significant at the 1% level

The results in Table 6.4 indicate that where the disclosure interactions are higher, the cost of equity capital is lower. This suggests that firms that consistently disclose greater information across the different types are more likely to enjoy a lower cost of capital than firms with lower disclosure interactions. A comparison between Table 6.2

and Table 6.4 suggests that the association between the cost of equity capital and disclosure is stronger when disclosures are interacted than for individual disclosures (compare t-tests statistics in the two tables). Similar conclusions can be drawn by looking at the mean cost of equity capital in the two tables. For example, at the individual disclosure level (see Table 6.2), high financial and intellectual capital disclosure firms have costs of equity capital of 9.01% and 8.41% respectively. However, when these two disclosure types are interacted, the cost of capital reduces significantly to 8.13%, which is 0.88 or 0.28 percentage points lower than for the individual financial and intellectual capital disclosures. These results seem to confirm the argument that different types of disclosure do interact with each other (see Pike *et al.*, 2000; Holland, 2003) in reducing the cost of capital, suggesting that in using disclosures investors attempt to balance the different disclosure types to decide on share prices.

Summary

This chapter presents the main findings of the study. The cost of equity capital is negatively and significantly associated with intellectual capital disclosure and financial disclosure suggesting that firms that provide greater levels of intellectual capital information in their annual reports benefit in terms of cost of equity capital. Further analyses divide firms into high and low disclosures via the median of each of the disclosure types. The independent t-tests of high/low disclosure firms show that the cost of equity capital is significantly different between the two groups. Firms with higher intellectual capital disclosure scores have cost of capital estimates that are 2.35 to 2.84 percentage points lower than for firms with lower intellectual capital disclosure across all intellectual capital categories. Similarly, the high voluntary financial information disclosing firms enjoy a 1.85 percentage points lower cost of equity capital than the low-disclosing firms. The magnitudes of the difference in cost of equity capital increases for the intellectual capital

intensive sector firms, ranging from 2.18% to 3.32%. Further analyses interacting financial and intellectual capital disclosures show further reductions for firms that have more intellectual capital and financial disclosures. In conclusion, firms that commit to improved intellectual capital disclosure in their annual reports benefit in terms of a lower cost of equity capital.

7 Summary and Conclusions

Objectives of the study

This study investigates whether intellectual capital disclosure is associated with the cost of equity capital. Intellectual capital has attracted considerable interest from practitioners, regulatory bodies, managers and academics, primarily stimulated by the perceived role it plays in the value-creating processes of firms. Consequently, there have been calls for improved disclosure of investments in intellectual capital. These calls have been driven particularly by the rationale that the traditional financial reporting model either immediately expenses or arbitrarily amortises investments in intellectual capital. As a result, it has been argued that financial statements have lost relevance to investors because they fail to fully reflect investment in intellectual capital (Francis and Schipper, 1999; Lev, 2001). The failure by traditional financial reporting systems to fully reflect intellectual capital investments, has created acute information asymmetries between investors and managers, and potentially increased opportunities for moral hazard, adverse selection and other opportunistic behaviour by managers. This view has inspired many researchers to investigate the extent to which intellectual capital information is reported in annual reports (Unerman *et al.*, 2007; Guthrie *et al.*, 2007). Such studies document that although intellectual capital reporting is still low, there has been an increase in intellectual capital disclosure in annual reports over the years. Unerman *et al.* (2007) show substantial intellectual capital disclosures even in sectors where intellectual capital may not be expected to be a significant value driver, such as real estate, utilities and retailing.

This report has argued that although the literature documents an increasing trend in intellectual capital disclosure, there is limited research on whether firms benefit from improved intellectual capital disclosure via a lower cost of capital. Reducing the cost of capital has been suggested by academics (see Lev, 2001) and accounting bodies and regulators (ICAEW, 2003; OECD, 2006) as a benefit of enhanced intellectual capital disclosure. Consequently, this study has provided some insights on the relationship between the cost of equity capital and intellectual capital disclosure. The key issues addressed by this study are:

- Is there a negative association between the cost of equity capital and the level of intellectual capital disclosure in annual reports?
- Is there a negative association between the cost of equity capital and the level of disclosure in the three individual intellectual capital categories (human; structural and relational capital)?
- Does intellectual capital disclosure interact with voluntary financial disclosure to influence the cost of equity capital?

Findings

This study found that the level of intellectual capital disclosure in UK annual reports is extensive, with an average of 70% of the intellectual capital information items used in this study being reported in some way. This high level of disclosure may have been driven by the study period (March 2004 and February 2005) because the eventually repealed mandatory Operating and Financial Review was to be introduced in 2005 and firms may have started adopting the requirements. In general, firms seem to provide greater levels of information about human intellectual capital and structural intellectual capital than information on relational intellectual capital, although human intellectual capital information seems to dominate the other two categories. Analyses classifying firms

into intellectual capital intensive sectors (such as banks and insurance, telecommunications, biotech and pharmaceuticals) and non-intellectual capital intensive sectors (such as utilities, retail, and real estate) indicate that both groups disclose equally greater information about their human and structural intellectual capital. However, firms in intellectual capital intensive sectors provide significantly higher relational intellectual capital than non-intellectual capital intensive sector firms.

The average cost of equity capital for the sampled UK listed firms, derived using the price-earnings growth model, is about 10.29%. For most firms (84.9% of the sample firms), the cost of equity capital ranges between 5% and 15%. Additional analyses splitting firms into intellectual capital and non-intellectual capital intensive sectors show that firms in the intellectual capital intensive sectors have a cost of equity capital that is about 0.88 percentage points higher than for firms in non-intellectual capital intensive sectors. The higher cost of equity capital in these sectors can be attributed to greater investor uncertainty due to high growth, intense competition and short product life cycles associated with such sectors.

The study reveals that intellectual capital disclosure is negatively associated with the cost of equity capital. Firms with greater levels of intellectual capital disclosures have cost of equity capital estimates ranging from 2.35 to 2.84 percentage points lower than for firms with low intellectual capital disclosures across all categories. The highest benefit comes from disclosing greater human intellectual capital information with 2.84 percentage points lower cost of equity capital for high intellectual capital disclosure firms. The analysis also reveals that intellectual capital intensive sectors have higher cost of equity capital than non-intellectual capital intensive sectors. However, firms in the intellectual capital intensive sectors seem to benefit more from greater disclosure of intellectual capital disclosure information. The results show that the magnitude of difference in the cost of equity capital is 3.32% lower for firms with greater intellectual capital disclosures. The findings

also suggest that investors interact intellectual capital information with financial information in making investment decisions. The results for interacting intellectual capital disclosure and voluntary financial disclosure measures show that the cost of equity capital is 0.28% and 0.88% lower when compared to the cost of equity capital relating to the individual intellectual capital and financial disclosures, respectively.

Limitations

The findings reported in this study must be interpreted in the context of the following limitations. The first limitation relates to measurement issues. Intellectual capital information and voluntary financial information were measured using a dichotomous procedure and this does not differentiate firms on the basis of the detail provided for each item. In addition, the procedure involves the application of judgement on whether the item of information being considered is indeed applicable to the firm and also to which category of disclosure. In the context of the cost of capital measure, the study uses only equity capital and not debt, so that the cost of capital used does not reflect the firm. The model used to measure the cost of capital relies on analysts' earnings forecasts, which may not be used by firms in the UK. However, Marston and Armitage (2007) suggest that some firms do use models that use analysts' forecasts in computing their cost of capital.

Second, the study uses annual reports to measure disclosure. Although there is research to suggest that annual reports are used, it is possible that because the information reported in annual reports is already known, its usefulness for investors is curtailed. This implies that the extent to which the information disclosed in the annual report affects the cost of capital may be minimal.

Areas of further research

Although the findings of this study have provided insights into the relationship between intellectual capital disclosure and the cost of equity capital, further research is warranted. First, this study can be replicated using finer measures of intellectual capital disclosure. Rather than using a dichotomous procedure to measure intellectual capital disclosure, further research could consider the detail provided for each disclosure item. This is likely to result in finer measures of intellectual capital disclosure which can better differentiate low and high-disclosing firms and enhance the quality of analysing the relationship between the cost of equity capital and intellectual capital disclosure. Second, the findings of the relationship between intellectual capital disclosure and cost of equity capital are based on univariate analyses and these do not control for other factors that may influence the cost of equity capital. This means that the relationships being observed may be due to these other factors rather than disclosure. Therefore further analyses controlling factors such as firm size, beta, analyst following, leverage and market-to-book values should be conducted to provide additional insights into the relationships. Third, further research could focus on examining the impact of the Disclosure and Transparency Rules and the new Companies Act 2006 on the reporting of intellectual capital. In this respect research could investigate whether intellectual capital reporting has improved as a result of the mandatory requirements to report some intellectual capital information and the extent to which the requirements might have affected the cost of capital.

Conclusions

In conclusion, this study investigates the association between intellectual capital disclosure and the cost of equity capital of UK listed firms. The results of the study indicate that there is extensive

disclosure of intellectual capital information by the firms. Overall, the study also reveals that firms with greater intellectual capital disclosure in annual reports have a lower cost of equity capital than firms with lower intellectual capital disclosures. In addition, firms that provide enhanced disclosures for both financial and intellectual capital disclosures do benefit more in terms of a lower cost of equity capital, suggesting that intellectual capital and financial disclosures are complementary. On the whole, however, intellectual capital disclosure seems to dominate financial disclosure in influencing the cost of equity capital.

The study contributes to the literature in a number of ways. First, it provides the first evidence of the relationship between the cost of equity capital and intellectual capital disclosure in a UK context. Second, unlike previous studies that tend to investigate aggregate annual report disclosures, this is the first study to distinguish between intellectual capital and voluntary financial disclosures and show how the two types of disclosure are independently associated with the cost of equity capital. Third, the study is also the first to empirically examine the effect of interacting intellectual capital and voluntary financial disclosures on the cost of equity capital.

The findings in this report are also of considerable importance to both policy makers and firms. Given the view expressed by both academics and policy makers that the traditional financial reporting model fails to provide investors with value-relevant information, it may well be that in the future, the reporting of intellectual capital information may be mandatory. The attempt by the UK to make the Operating and Financial Review (OFR) mandatory in 2005 (regulation later repealed) indicates potentially that future regulations may be formulated. However, regulations should only be necessary if firms are not forthcoming in enhancing the disclosure of intellectual capital information in order to reduce information asymmetry. Reducing information asymmetry decreases the chance that well-informed investors earn abnormal returns from trading with uninformed investors. As

Holland (2001) argues, there is potential that market participants, such as institutional investors, may trade on information generated from private communications for which other investors may not be aware of.

Therefore, the report is important for the following reasons:

- The findings show that disclosure of intellectual capital information by UK listed firms is extensive and the extensive intellectual capital disclosure seems to be driven by the voluntary guidelines provided in the OFR. The implication for policy is that the decision to repeal the regulation for a mandatory OFR may have been appropriate as firms respond to voluntary reporting guidelines. Hence, the focus for policy should be to develop best practice guidelines for intellectual capital reporting and encourage compliance with such guidelines. Such an approach reduces problems with prescriptive guidelines which require enforcing.
- The evidence presented in this report shows that enhanced intellectual capital information disclosure is associated with a lower cost of capital, suggesting that investors find the information useful for the valuation of firms. Thus, improved intellectual capital disclosure will also benefit market participants in terms of having more relevant information available, and therefore reducing the cost of gathering private information. This understanding is important for policy makers because it provides a basis upon which regulators can evaluate the costs and benefits of intellectual capital disclosure as well as costs and benefits of potential regulations regarding the disclosure of intellectual capital information.
- Armitage and Marston (2007) document that firms use cost of capital information in their capital investment decisions, and that finance directors perceive disclosure as influencing their cost of capital. The findings in this report provide managers with insights into the effects of enhancing disclosure of intellectual capital information on

their cost of equity capital. Additionally, they can also gain some insights into the intellectual capital disclosure categories that are more important to investors in valuing firms. Therefore, if managers realise that there are cost of capital related benefits in enhancing the reporting of intellectual capital information, they may have incentives to improve disclosure of this type of information.

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APPENDIX 1

Disclosure checklist

A Intellectual Capital Information

I Structural Capital

1. Intellectual property
2. Process
3. Management philosophy
4. Corporate or organisational culture
5. Organisational flexibility/adaptability
6. Organisational structure
7. Organisational learning
8. Research and development
9. Innovation
10. Technology
11. Financial relations
12. Customer support function
13. Knowledge-based infrastructure
14. Quality management and improvement
15. Accreditations
16. Overall infrastructure/capability
17. Networking
18. Distribution network

II Relational Capital

19. Customers
20. Market presence
21. Customer relationships
22. Customer acquisition
23. Customer retention
24. Customer training and education
25. Customer involvement
26. Company image/reputation
27. Company awards
28. Public relations
29. Diffusion and networking
30. Brands
31. Distribution channels
32. Relationship with suppliers
33. Business collaborations
34. Business agreements
35. Favourable contracts
36. Research collaborations
37. Marketing
38. Relationship with stakeholders
39. Market leadership

III Human Capital

40. Number of employees
41. Employees age
42. Employee diversity
43. Employee equality
44. Employee relationship
45. Employee education
46. Skills/know-how/expertise/knowledge
47. Employee work-related competences
48. Employee work-related knowledge
49. Employee attitudes/ behaviour
50. Employee commitments
51. Employee motivation
52. Employee productivity
53. Employee training
54. Vocational qualification
55. Employee development
56. Employee flexibility
57. Entrepreneurial spirit
58. Employee capabilities
59. Employee teamwork
60. Employee involvement with community
61. Other employee features

B Voluntary Financial Disclosures

I Financial Analysis

1. Profitability ratios
    i. gross margin
    ii. operating margin
    iii. net profit margin
    iv. return on equity
    v. return on capital employed
2. Cash flow ratios
    i cash flow conversion ratio
    ii. free cash flow to equity
    iii. cash flow to total debt
3. Liquidity ratios
    i. current ratio
    ii. acid test
4. Gearing ratios
    i. gearing ratio
    ii. interest cover
    iii. debt/EBITDA
5. Dividend cover ratio
6. Graphical presentation of key data
    i. total sales
    ii. sales by business segment/product line
    iii. operating profit
    iv. operating cash flows
    v. earnings per share
    vi. dividend per share

7. Analysis of free cash flows
8. Financial history summary
    i. two years
    ii. three years
    iii. four years
    iv. five years
    v. more than five years
9. Comments on change in sales
    i. note
    ii. detail
10. Comments on change in operating profit
    i. note
    ii. detail
11. Comments on change in cost of goods sold
    i. note
    ii. detail
12. Comments on change in selling and administration expenses
    i. note
    ii. detail
13. Comments on change in interest expense or interest income
    i. note
    ii. detail
14. Comments on change in working capital
    i. stock
    ii. debtors
    iii. creditors
15. Discussion of cash flow position
    i. cash inflows and outflows
    ii. cash flow balance

16. Discussion of capital structure
17. Commentary on level of borrowings
    i. level
    ii. detail
18. Discussion of acquisitions and effects of results
    i. discussion of acquisition
    ii. discussion of effects on results
19. Discussion of disposals and effects on results
    i. discussion of disposals
    ii. discussion of effects on results
20. Commentary on the effects of inflation on operations
21. Commentary on effects of interest rates on operations
22. Effects of foreign currency fluctuations on operations
23. Effects of commodity prices on results
24. Disclosure of capital expenditure in general
    i. level
    ii. detail
25. Quantitative geographical capital expenditure
26. Quantitative line of business capital expenditure
27. Creditor payment policy

II Forecast Information

28. Forecast of sales
    i. qualitative forecast of sales
    ii. quantitative forecast of sales
    iii. assumptions underlying the forecasts

29. Forecast of profits
    i. qualitative forecast of profits
    ii. quantitative forecast of profits
    iii. assumptions underlying the forecasts
30. Forecast of cash flows
    i. qualitative forecast of cash flows
    ii. assumptions underlying the forecasts
31. Order book or backlog information
    i. total order book
    ii. by line of business
    iii. by geographical area

III Capital Market Data

32. Share trading information
    i. trend
    ii. year end
33. Share price information
    i. trend
    ii. year end
    iii. range
    iv. detail (monthly/quarterly)
34. Domestic and foreign shareholdings
35. Distribution of shareholdings by type of shareholders

APPENDIX 2

The price-earnings growth model

The model used in this study to compute the cost of equity capital of UK sampled listed companies is the price-earnings growth (PEG) model developed by Easton (2004). The PEG model is used in this study for a number of reasons. First, the method has less onerous data requirements, only requiring share prices and analyst earnings forecasts to compute the cost of equity capital. Second, prior studies (Botosan and Plumlee, 2005; Easton and Monahan, 2005; Hail and Leuz, 2006) show that the estimates for the cost of capital from the PEG model are fairly similar and positively correlated to the other two alternative approaches: residual income valuation (RIV) model and abnormal earnings growth (AEG) model. However, they also show that the PEG model dominates the two alternative approaches in terms of how the cost of capital estimates correlate with the known risk proxies. Chen et al. (2004) also show in an international setting that the RIV model performs poorly in European countries, and that the AEG model is either inferior to, or equivalent with, the PEG model in all countries. Finally, using the PEG model enables comparison of the cost of equity capital estimates with those obtained by Lee et al. (2006) using the same model to compare the cost of capital of UK and European companies.

The PEG model computes the implied cost of equity capital of a company using one-year-ahead and two-year-ahead earnings per share forecasts as well as the share price. In developing the model, Easton (2004) started the no arbitrage assumption that current price is equal to the discounted value of next period's expected price (adjusted for the expected dividend payout during the period):

$$P_0 = (1 + r)^{-1} [P_1 + dps_1] \quad (1)$$

Where:

P_0 = Share price at time $t = 0$;
P_1 = Expected share price at time $t=1$;
dps_1 = Expected dividends per share at time $t = 1$; and
r = Expected rate of return and $r > 0$ is a fixed constant

Easton (2004) then adds (and subtracts) capitalised expected accounting earnings, eps_1/r, to Equation (1) to capture the valuation role of forecasts of next period's accounting earnings. This yields:

$$P_0 = eps_1/r - [eps_1/r - (1 + r)^{-1} (P_1 + dps_1)] \quad (2)$$

Assuming that the expected accounting earnings, eps_1 is not equal to economic earnings, Easton (2004) re-writes Equation (2) to consider the role of two-period-ahead forecasts of accounting earnings. This results in:

$$P_1 = eps_2/r - [eps_2/r - (1 + r)^{-1} (P_2 + dps_2)] \quad (3)$$

Substituting Equation (3) into Equation (2) yields:

$$P_0 = eps_1/r + r^{-1}(1 + r)^{-1} agr_1 + (1 + r)^{-2}[r\, dps_2 - (1 + r)\, eps_2] + (1+r)^{-2} P_2 \quad (4)$$

Where:

$$agr_1 = [eps_2 + r dps_1 - (1 + r) eps_1] \quad (5)$$

agr_1 is the expected abnormal growth in accounting earnings

Easton (2004) then performs recursive substituting for P_2, P_2, P_4, etc., in Equation (5) to consider the valuation role of expected accounting earnings beyond the two-year forecast horizon. This yields:

$$P_0 = eps_1 / r + r^{-1} \sum_{t=1}^{\infty} (1+r)^{-t} agr_t \qquad (6)$$

suggesting that the present value of the agr_t- sequence explains the difference between price and capitalised expected earnings. Easton (2004) then modifies Equation (6) to accommodate a finite forecast horizon by defining a perpetual rate of change in abnormal growth in earnings (Δagr) beyond the forecast horizon. Assuming earnings are available for two periods, Equation (6) may be written as:

$$P_0 = eps_1/r + agr_1/(r(r - \Delta agr)) \qquad (7)$$

Where:

$$\Delta agr = (agr_2/agr_1) - 1$$

Easton (2004) then imposes the assumption, where $\Delta agr = 0$, implying that the expected abnormal earnings growth of next period is an unbiased estimate of subsequent periods' abnormal earnings growth (that is $agr_1 = agr_2 = agr_3 = \ldots,\ldots$). *By imposing this assumption, Equation (7) may be re-written as*:

$$P_0 = [eps_2 + rdps_2 - eps_1]/r^2 \qquad (8)$$

and solving this Equation 8 leads to:

$$r = \sqrt{\frac{eps_2 + rdps_1 - eps_1}{P_0}} \qquad (9)$$

Finally, Easton (2004) then imposes two additional assumptions. One, $dps_1 = 0$, and two, that growth is non-negative: $eps_2 \geq eps_1 > 0$. The latter assumption is to avoid having to take the square root of a negative number. Imposing these assumptions on Equation (9) yields the following valuation formula, which is employed to compute the cost of equity capital in this study:

$$r_{PEG} = \sqrt{\frac{eps_2 - eps_1}{P_0}} \tag{10}$$

Like any other accounting-based valuation model, the PEG model has limitations. First, the model excludes dividends and longer horizon growth in the computation of the cost of capital estimates. However, Botosan and Plumlee (2005) and Easton and Monahan (2005) show that the correlations between the implied cost of equity capital computed from the AEG (which incorporates both dividends and longer horizons) and the known risk proxies are weaker than with the PEG model. Second, the assumption that $eps_2 \geq eps_1 > 0$ imposes sample restrictions in this study in that all companies that fail to meet this assumption are eliminated in the analyses. This may have biased the sample towards more stable and less risky companies (Lee et al., 2006). However, there is no reason to suggest that these restrictions could have materially affected the cost of equity capital estimates used in the study.

About the Authors

Dr Musa Mangena is a Senior Lecturer in Accounting at the Bradford University School of Management. His main research interests are in the areas of corporate reporting, economic consequences of disclosure, corporate governance and performance measurement. His work has been published in a number of academic journals, including Accounting and Business Research, European Accounting Review, The International Journal of Accounting, Journal of Applied Accounting Research and International Journal of Auditing.

Richard Pike is Professor of Accounting and Finance at the University of Bradford. His research interests and publications cover topics such as capital budgeting, credit management, performance measurement and intellectual capital disclosure.

Dr Jing Li is a Lecturer in Accounting at the University of Bradford School of Management. Her research interests are in the areas of intellectual capital disclosure and corporate governance.

Intellectual Capital Disclosure Practices and Effects on the Cost of Equity Capital: UK Evidence

In a knowledge intensive economy, a company's intellectual capital, whether it is derived from its employees, customer databases or brands, undoubtedly contribute to a company's success and its ultimate value. Most of these intangible assets can not be included within a company's balance sheet and intellectual capital disclosures in the annual report and financial statements have been largely voluntary.

There are good reasons why companies may choose not to disclose information about these types of assets, not least the worry about losing competitive advantage, but there are clearly reasons why companies choose to make such voluntary disclosures. It is argued that one reason for disclosing such information is to reduce the information gap between companies and investors and thus reduce the cost of capital. This report investigates the relationship between intellectual capital disclosure and the cost of equity capital.

The results of this study indicate that firms which make greater levels of intellectual capital disclosure benefit from a lower cost of equity capital than firms making lower intellectual capital disclosures. The study estimates that this benefit is significant, at 2.8 percentage points. The study recognises that other factors may also be at play and that further research is necessary to investigate the impact of these other factors.

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CA HOUSE • 21 HAYMARKET YARDS • EDINBURGH • EH12 5BH
TEL: 0131 347 0237 • FAX: 0131 347 0114
EMAIL: research@icas.org.uk • WEB: www.icas.org.uk/research