Disclosure of information on intellectual capital in Danish IPO prospectuses

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Abstract

Purpose – The purpose of this paper is to examine whether information on intellectual capital (non-financial information on knowledge based resources) is disclosed in Danish IPO prospectuses. Further, to analyse whether this voluntary disclosure has changed in the period from 1999 to 2001 and to analyse what factors can explain the amount of disclosure in the prospectuses.

Design/methodology/approach – The paper uses content analysis to compile a measure of disclosure on each prospectus and statistical analysis to test whether there is an association between disclosure and company type, the existence of managerial ownership before the IPO, the size of the company or the age of the firm.

Findings – Based on statistical analysis, it is concluded that the extent of managerial ownership prior to the IPO and industry type affects the amount of voluntary intellectual capital disclosure, while company size and age do not affect disclosure. The results are interpreted in the light of the increasing importance of disclosing information on value drivers, strategy and intellectual capital to the capital market and constitute a contribution to the ongoing debate on corporate reporting practices.

Practical implications – Since information on intellectual capital is already disclosed in IPO prospectuses this reporting form can be used as inspiration when an intellectual capital report is developed. The results also indicate that companies and their advisers believe that this type of information is important in the capital market's assessment of the company's value. Further, it is suggested that intellectual capital reports should be read in the context of the firm's strategy in the same manner as an prospectus is read.

Originality/value – Very few papers have analysed disclosure in prospectuses and it has been from a different perspective from this paper. Further, this paper analyses a time series of data and demonstrates how the amount of disclosure has developed over the years. Finally, the paper contributes to the body of literature on what factors explain disclosure in general.

Keywords Disclosure, Intellectual capital, Prospectuses, Denmark

Paper type Case study

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Introduction

In recent years, companies' disclosure of information has gained increased attention due to globalisation and integration of capital markets, greater mobility of monetary and actual goods, tougher competition, new dominating industries, and developments in IT and the internet. Reports (e.g. Eustace, 2001; FASB, 2001; Upton, 2001) and academic contributions (e.g. Lev, 2000; Beattie and Pratt, 2002a, b) have argued that demand for external communication or information on knowledge-based resources is growing as companies increasingly base their competitive strength and thus the value of their company on know-how, patents, skilled employees and other intangibles. This demand for external communication applies to both traditional annual reporting and newer types of reporting such as intellectual capital statements, supplementary business reporting and prospectuses.

The Scandinavian countries are often noticed for their practices with respect to disclosure of intellectual capital (e.g. Holland, 2004, p. 11). Especially the Danish Government initiatives with publishing a guideline for intellectual capital statements (DATI, 2001; DMSTI, 2003) has been highlighted as an example of state-of-the-art disclosure models and business reporting (e.g. DiPiazza and Eccles, 2002, pp. 72-73; Fincham and Roslender, 2003, p. 71).

In this paper, we analyse the disclosure of information in Danish initial public offering (IPO) prospectuses from the last 12 years, primarily with respect to voluntary disclosure of non-accounting information on knowledge-based resources – also called intellectual capital. The methodology used in the analysis is a disclosure index consisting of 78 items. Disclosure index research in accounting and business reporting practices has been widely applied (Marston and Shrives, 1991; Guthrie *et al.*, 2004), because such studies represent an aspect of disclosure quality that can be captured by summary measures (Beattie *et al.*, 2002a).

The remainder of the paper is structured as follows. First recent trends in business reporting are discussed and it is argued that the IPO prospectuses should be studied in order to gain insight into the need for disclosure. Further, the section presents the factors that will be taken into consideration in explaining differences in disclosure. In the following, two sections the methodology and the available data is described. Then, the results are presented and analysed and the paper is concluded with suggestions for further research.

Business reporting and companies' external communication

The relative importance of physical assets such as plant, equipment and stocks, compared to, for example, patents, skilled employees and strategic relationships, are declining. These changes in value creation have led many companies to experiment with new modes of external communication – modes that convey information not presently incorporated in financial reports. The alternatives vary from mass media communication, via business reporting models and internet reporting to a wide spectrum of stakeholders, to disclosure through investor relations meetings and private meetings between company management and institutional investors and analysts (Holland, 1997; Beattie, 1999; Beattie and Pratt, 2001).

Among others Blair and Wallman (2001, p. 59) have argue for the necessity of a model for business reporting that reflects the dynamics of wealth creation and Gelb (2002) have indicated that supplementary disclosure is an important medium for firms

with significant levels of intangible assets. In relation to this, Galbraith and Merrill (2001) suggest that information on company strategy is incorporated into investors' decisions, and that information on intellectual capital – especially management experience – does have an effect on the valuation of the company. One of the instruments that have been suggested as a tool both for identifying, managing and reporting intellectual capital and intangibles is the intellectual capital statement (see DMSTI, 2003; Zambon, 2003).

Even though the precise definition of a report on intellectual capital in the literature is connected with some ambiguousness, the statements that have been disclosed in Denmark since 1998 where Coloplast as the first firm issued an intellectual capital statement have many similarities. Most often intellectual capital is defined as knowledge resources, in the form of employees, customers, processes or technology, which the company can mobilize in its value creation processes. In practice intellectual capital statements contain various financial and non-financial information, i.e. staff turnovers and job satisfaction, in-service training, turnover split on customers, customer satisfaction, precision of supply etc. (see Bukh *et al.*, 2001; Mouritsen *et al.*, 2001), as well as a substantial narrative part positioning the indicators within a strategic framework.

There is no doubt that the general reporting practices with respect to voluntary disclosures is especially well-developed in Denmark and it might be argued that studying the disclosure of intellectual capital in a Danish or Scandinavian context would be misleading if generalized to a wider institutional context. However, this does not necessarily indicate that the practices have influenced the decision-makers with respect to disclosures in IPO prospectuses, namely the investment banks. Furthermore, it should be taking into account that the first Danish IC reports were published in 1998 while our sample spans more years. Another interpretation of the results from studying a Danish context could be that is presently the Danish case may be the future in other countries.

Various studies of investors' and analysts' information demands indicate a substantial difference between the types of information found in companies' annual reports and the types of information demanded by the market (Eccles *et al.*, 2001; Eccles and Mavrinac, 1995). In cooperation with the Institute of Chartered Accountants of Scotland (ICAS), Beattie (1999) studied the ability of financial reporting to satisfy users' demands. The results illustrated that although non-financial information still has lower priority than traditional financial information; users consider disclosure regarding risk factors and quality of management to be insufficient.

Theoretically, additional relevant non-financial information is expected to lower the cost of equity capital (see Verrecchia, 2001) because increased disclosure lowers investor uncertainty about the future prospects of the company and facilitates a more precise valuation of the company (Botosan, 1997). Related to this argument, the disclosure of information on intellectual capital is expected to reduce information asymmetry and to enhance stock market liquidity and increase demand for companies' securities (for example Diamond and Verrecchia, 1991). Both Botosan (1997) and Richardson and Welker (2001) confirm this in that they conclude that the quantity and quality of financial disclosure is negatively related to the cost of equity capital for companies.

The IPO prospectus

The IPO prospectus has by Beattie (1999) as well as Cumby and Conrad (2001) been suggested as a "role model" for future reporting because companies are typically more open and future-oriented in their IPO reporting. It has also been claimed by Daily *et al.* (2003) that IPO prospectuses are likely to be especially accurate because companies are liable for any misleading or inaccurate information. Although the same could be said about other reporting media including the annual report it can be observed that the prospectus usually contains more information about future expectations regarding market developments and earnings, strategic direction and intent, management and board composition, etc., compared to the annual report from the same firm. This is at least the case for a number of Scandinavian prospectuses that have been examined by the authors of this paper. However, there are likely to be substantial differences in national legislation and traditions with respect to disclosure in prospectuses. In a recent study of disclosure in interim report of Greek firms by admission of securities to Athens Stock Exchanges, Mavridis (2002) noted for instance that annual reports as they are used in other countries are not very common among Greek medium-sized firms.

At the time of admission for listing on the stock exchange, the company publishes its IPO prospectus in order to market the share to investors. An admission to listing on the stock exchange offers a unique opportunity to study the amount and type of voluntary information considered for disclosure to the capital market. Thus, Mather *et al.* (2000) argue that management has an incentive to present the company in the best possible light in order to maximise the proceeds of the share issue (see also Aharony *et al.*, 1993). Although this could lead to earnings management, managers of companies involved in taking a company public have incentives to present the underlying information in the most favorable light possible (Mather *et al.*, 2000). Thus, the IPO prospectus provides insight into which types of information are selected by a company and its advisors for presenting the company in relation to investors and analysts.

Admission for listing on the stock exchange requires the company to report about its achievements, skills and growth potential in a reliable and sober manner, in order to demonstrate to investors that investing in the company will most likely generate a competitive return. This effort to attract investors is centred on the IPO prospectus, which clarifies the company's financial capability, performance, operation, skills, and the resources through which it intends to prove continued growth and increased shareholder wealth. With regard to this aspect, Ang and Brau (2002) show that greater company transparency before the initial issue decreases the flotation costs of the IPO, and Schrand and Verrecchia (2004) find that greater disclosure frequency in the period prior to the IPO is associated with less underpricing.

The annual report has not only investors as its readers as it also conveys information to employees, potential employees, customers, the press and other stakeholders. Compared to that the IPO prospectus have a more limited group of readers than annual reports, and some differences in extent of disclosure can be expected. Compared to annual reports, prospectuses can be expected to provide additional disclosure of the company's long-term strategy, a specification of leading non-financial indicators relevant in assessing the effectiveness of the strategy implementation, comprehensive disclosure on company risks, and a discussion of the relation between leading indicators and future profits (Cumby and Conrad, 2001).

Disclosure

A substantial body of research conducted from an information-economics perspective has concentrated on studying why companies disclose more information than is required by regulation. In relation to IPO prospectuses, Jenkinson and Ljungquist (2001) provides a comprehensive review of the literature. In general, proxies for *ex ante* uncertainty such as, underwriter reputation (Megginson and Weiss, 1991) as well as disclosure of earnings forecasts in IPO prospectuses (Clarkson and Merkley, 1994) have been shown to reduce under-pricing. Most under-pricing models (see Jenkinson and Ljungquist, 2001) predict that reducing *ex ante* uncertainty, for example by improved disclosure, and reduces under-pricing. Thus, by increasing voluntary disclosure, the *ex ante* uncertainty surrounding an issue is reduced and thus the firm's need for under-pricing also lessens.

In this paper, we study the extent of voluntary disclosure in Danish IPO prospectuses and investigate whether this can be explained by four control variables – industry differences, managerial ownership before the IPO, company size and company age. The first factor, industry differences, has previously been used to explain differences in disclosure in annual reports by Adrem (1999) and Cooke (1989) because there are differences in industry disclosure norms (see Gibbins *et al.*, 1990). As intellectual capital is regarded as being especially important in high-tech industries, it is anticipated that IT and biotechnology companies will disclose more information than traditional manufacturing and commercial companies. Further, since the market-to-book values of IT and biotechnology companies are generally higher, the disclosure of measures that lie outside the traditional accounting realm is likely to be relatively more important.

Turning to a corporate governance perspective, the second factor, managerial ownership before the IPO, may influence companies' disclosure practices and thus the extent of disclosure in the IPO prospectus. The existence of some degree of managerial ownership in the company is a mechanism for ensuring management – shareholder alignment of interests (Demirag *et al.*, 2000, p. 348). According to O'Sullivan (2000, p. 409), we can expect less disclosure from management if there is significant managerial ownership. In accordance with this line of argument, directors of the board who themselves do not own a substantial portion of the company can be expected to encourage more intensive auditing and disclosure because they are more likely to perceive them-selves as fulfilling a monitoring role. Similarly, Hossain *et al.* (1994), in a study of listed Malaysian companies, conclude that the amount of voluntary disclosure varies with ownership structure.

Other factors such as firm size and internationalization are also likely to influence disclosure. Robb *et al.* (2001), for instance, find that larger firms and firms with a global focus provide higher levels of both forward-looking and historical non-financial disclosures in their annual reports than other firms, while they in the same study only find minimal industry and country effects.

This leads us to the third category of research, where company size has been related to the amount of voluntary disclosure. Empirical studies date back to the 1950s, where, for example, Anton (1954) concluded that one-third of large American and Canadian companies regularly present results to stockholders while the corresponding figures for small companies are one out of 20. Among the explanations are that larger companies are more likely to have a wider ownership base, and that the costs of

providing information are more prohibitive for small companies. The latter problem tends to grow with increased disclosure.

However, another factor to be considered is that larger companies, when compared to smaller ones, seem less risky to investors and have better access to resources. Small companies thus have greater incentives to reduce uncertainty by disclosure. This argument presumes that a small company – all other things being equal – should disclose more information and more details on competitors than is the case for a large company. These implications have been supported in studies by, for example, Ahmed and Courtis (1999) and Adrem (1999). However, not all studies conclude that the size of the company is a significant factor in explaining voluntary publication of information. For instance, Wallace (1988) and Stanga (1976) who conclude that size is not a significant factor in explaining differences in companies' reporting between Nigeria and the USA.

Finally, company age has often been seen as a proxy for risk in the sense that the more established companies are less risky. From this perspective, the extent of a company's disclosure is expected to be related to how many years it has been in business. For example, Kim and Ritter (1999, p. 430) provide evidence that non-financial information is of greater importance in the valuation of younger companies because forecast earnings work better for assessing younger companies than historical earnings do (see Klein, 1996; Amir and Lev, 1996). Furthermore, Jaggi (1997, p. 314) demonstrates that the number of years the company has been in business influences the accuracy of the forecasts disclosed in IPO prospectuses. These results indicate that there might be a negative relationship between the age of the company and the extent of its disclosure.

From the prior empirical research outlined above, the four hypotheses below are developed. As none of the literature reviewed above relates directly to disclosures in connection with IPO's, and because there are varying competing explanations the hypotheses are stated in the null form:

H1. *Industry differences*. There is no association with respect to disclosure of information on intellectual capital between companies in high-tech industries (IT and biotechnology) and traditional manufacturing and commercial companies.

H2. *Managerial ownership*. There is no association between the amount of disclosure on intellectual capital and the existence of managerial ownership before the IPO.

H3. *Company size*. There is no association between the amount of disclosure on intellectual capital and the size of the company.

H4. *Company age*. There is no association between the amount of disclosure on intellectual capital and the age of the firm.

These factors have been raised and studied in the disclosure literature and can contribute with insights with respect to understanding the mechanisms of disclosure in connection with an IPO. While *H1* might be explained by industry norms and institutionalized disclosure practices and furthermore that there are significant differences in competitive aspects across industry groups, the three latter control variables (*H2*, *H3*, *H4*) primarily concern the minimization of risk from the investors

perspective. Pre-IPO managerial ownership is an important factor, because it indicates to potential investors whether the people who know the most about the future prospects of the company, namely its present management team, considers the company a good investment. Age and size are proxies for the chance of the company going bankrupt, i.e. age concerns the history of the company and size relates to whether it has critical mass to survive a fierce competitive environment over time.

Methodology

In the empirical part of this paper, a disclosure index is used to quantify the amount of information regarding intellectual capital included in the prospectuses. This tool has most often been applied to quantify the extent of disclosure in annual reports (e.g. Hossain *et al.*, 1994; Adrem, 1999). However, its application is not limited to annual reporting, although it has also in been applied to IPO prospectuses by Cumby and Conrad (2001) as well as Guo *et al.* (2004), who studied product-related IPO disclosure in biotechnology companies.

The disclosure index methodology consists of the calculation of the number of information-related items that a given report contains, based on a predefined list of the possible index items. Items such as the distribution of turnover between geographical segments, number of patents, and influence of research on staff satisfaction are examples of items, which could be included in the index. The number of items included in the index varies between the specific studies. Barrett (1976), for example, includes only 17 items in his index and in Cooke's (1989) study as many as 224 items were included.

Further, the disclosure index can include only voluntary information (Adrem, 1999; Hossain *et al.*, 1994; Gray *et al.*, 1995; Guthrie and Petty, 2000), mandatory information (Wallace *et al.*, 1994), or both voluntary and mandatory information (Inchausti, 1997; Beattie *et al.*, 2002b). See also Marston and Shrives (1991) for a more detailed description of the use and methodology of disclosure indices. The particular research design was chosen for our study because the disclosure index approach represents a proxy for the quality of disclosure of intellectual capital in IPO prospectuses. When applying such an approach, it is, however, important to consider the reliability of the results and the objectivity of the study (Unerman, 2000). In the present study, these criteria are handled through a thorough literature review, clear instructions in the coding process and verifying the coding through separate coding by multiple researchers.

It can be argued that the amount of disclosure might not be an exact indicator of disclosure quality (Beattie *et al.*, 2004, p. 210). However, as we are concerned with extent of disclosure, we find the disclosure index method to fulfill our requirements satisfactorily. Beattie *et al.* (2004, p. 213) also express concerns in relation to the ability of a "one-dimensional" approach to the study of a complex, multi-faceted concept. Thus, their reservations relate to losses of detail in the data that such methods lead to. Despite this, Guthrie *et al.* (2004) suggest this method as a fruitful avenue for future research into voluntary disclosures in business reporting.

The disclosure index

There are no widely accepted theoretical guidelines for selecting items; therefore, the successful use of the disclosure index methodology depends on critical and cautious

selection of items (Marston and Shrives, 1991). As the focus of this article is voluntary information, the choice of items was based on a thorough inspection of the literature on corporate disclosure (see Eccles and Mavrinac, 1995; AICPA, 1994; Blair and Wallman, 2001; Beattie *et al.*, 2002b; Beattie and Pratt, 2002a) and intellectual capital reporting (Guthrie and Petty, 2000; DATI, 2001; Sveiby, 1997). Regarding intellectual capital statements, the experiences and results of the major Danish project concerning intellectual capital statements (DATI, 2001; DMSTI, 2003) were a major source of insight. Since the analysis focuses on the voluntary extent of disclosure in IPO prospectuses, information required by the authorities was not included in the index.

In our study of the extent of voluntary disclosure of non-accounting information –, e.g. information on knowledge-based resources, strategy and processes – in Danish IPO prospectuses, a disclosure index consisting of 78 items was applied. Table I show that these items were divided into six different categories and provide information on the number of items in each category. All items in the disclosure index are listed in Table II.

The extent of disclosure was quantified as the percentage of recorded information items found in the prospectus. In other words, the IPO prospectus is given one point if a given index item is found in the prospectus and no points if the given item is not found in the prospectus. This can be seen in the following formula, which was used to calculate the index score of each IPO prospectus:

$$\text{Score} = \left(\sum_{i=1}^{m} d_i/\text{M}\right) \times 100\%,$$

where d_i expresses item$_i$ with the value 1 if the item$_i$ was found in the IPO prospectus in question and otherwise 0. M expresses the maximum amount of information contained in a prospectus, i.e. 78 items. However, if the index of items is sufficiently comprehensive, every company is ranked equally whether the items are weighted or not because an extensive list of items implies gradual equalization (see Firth, 1979). For example, Chow and Wong-Boren (1987) applied both weighted and non-weighted indices and reached the same results.

Data

The data consist of the IPO prospectuses from all stock exchange listings at the Copenhagen Stock Exchange from 1990 until 2001, excluding the listings that pertain to increases in share capital and the listings of unit trusts. Unit trusts are also not included as their objectives are significantly different from those of other companies. No firm were introduced on the Copenhagen Stock Exchange in 2002-2003.

Table I.
The disclosure index (78 items)

	Items
Employees	27
Customers	14
IT	5
Processes	8
Research and development	9
Strategic statements	15

	Percentage of companies making disclosure		Percentage of companies making disclosure
Employees (27 items)	17.8	*IT (five items)*	16.8
Staff breakdown by age	25.0	Description and reason for investments in IT	10.3
Staff breakdown by seniority	19.1	IT systems	47.1
Staff breakdown by gender	2.9	Software assets	5.9
Staff breakdown by nationality	5.9	Description of IT facilities	7.4
Staff breakdown by department	70.6	IT expenses	13.2
Staff breakdown by job function	17.6		
Staff breakdown by level of education	25.0	*Processes (eight items)*	15.3
Rate of staff turnover	7.4	Information and communication within the company	19.1
Comments on changes in number of employees	19.1	Efforts related to the working environment	22.1
Staff health and safety	7.4	Working from home	0.0
Absence	1.5	Internal sharing of knowledge and information	25.0
Staff interview	4.4	External sharing of knowledge and information	17.6
Statements of policy on competence development	30.9	Measure of internal or external failures	8.8
Description of competence development program and activities	26.5	Fringe benefits and company social programs	1.5
Education and training expenses	4.4	Environmental approvals and statements/policies	27.9
Education and training expenses/number of employees	1.5		
Employee expenses/number of employees	8.8	*Research and development (nine items)*	22.7
Recruitment policies	14.7	Statements of policy, strategy and/or objectives of R&D activities	41.2
HRM department, division or function	4.4	R&D expenses	39.7
Job rotation opportunities	8.8	R&D expenses/sales	20.6
Career opportunities	10.3	R&D invested in basic research	4.4
Remuneration and incentive systems	67.6	R&D invested in product design/development	7.4
Pensions	10.3	Future prospects regarding R&D	26.5

(*continued*)

Table II.
The disclosure index

Table II.

	Percentage of companies making disclosure		Percentage of companies making disclosure
Insurance policies	25.0	Details of company patents	27.9
Statements of dependence on key personnel	44.1	Number of patents and licenses etc.	22.1
Revenues/employee	13.2	Patents pending	14.7
Value added/employee	2.9		
		Strategic statements (15 items)	27.9
Customers (14 items)	27.5	Description of new production technology	35.3
Number of customers	47.1	Statements of corporate quality performance	41.2
Sales breakdown by customer	7.4	Strategic alliances	69.1
Annual sales per segment or product	80.9	Objectives and reason for strategic alliances	35.3
Average customer size	2.9	Comments on the effects of the strategic alliances	30.9
Dependence on key customers	41.2	Description of the network of suppliers and distributors	66.2
Description of customer involvement	25.0	Statements of image and brand	38.2
Description of customer relations	47.1	Corporate culture statements	8.8
Education/training of customers	13.2	Best practice	2.9
Customers/employees	1.5	Organizational structure	45.6
Value added per customer or segment	14.7	Utilisation of energy, raw materials and other input goods	4.4
Market share (%)	47.1	Investment in the environment	10.3
Relative market share	32.4	Description of community involvement	4.4
Market share, breakdown by country/segment/product	19.1	Information on corporate social responsibility and objective	1.5
Repurchase	5.9	Description of employee contracts/contractual issues	25.0

The full list of IPOs was obtained from the Stock Exchange, and the actual 68 IPO prospectuses were obtained either from the companies themselves or from the underwriting banks. For the purpose of our analysis, we only considered the disclosure in the IPO prospectuses. The average disclosure of all the indicators included in our disclosure index is 22 per cent, varying from Lundbeck's (Danish pharmaceutical company, IPO in 1999) prospectus, which discloses 51 per cent of the proposed voluntary information items, to Sparekassen Svendborg's (Danish bank, IPO in 1990), which does not disclose any of the items at all. Of the overall categories of the disclosure index, "strategic statements" and "customers" are the information categories where most information is disclosed, both averaging 28 per cent across the total sample (see Table II for all sub-totals and disclosure percentages).

Table III classifies the IPO prospectuses by industry. It shows the increasing importance of IPO's within the IT and pharmaceutical sectors in most recent years. However, when the time period is taken as a whole, it is still the production and trading companies that dominate listings on the stock exchange, encompassing 44 IPO listings out of 68.

Descriptive statistics for the three continuous variables "age", "size", and "managerial ownership before the IPO" are shown in Table IV. In most cases the data for these variables were contained in the prospectus but otherwise the firms were contacted or the data were obtained from the Danish register of firms with limited liability.

Results

In Table V, the average disclosure per prospectus has been calculated as described above and divided into the six different categories depicted in Table I. In interpreting the data, it should be kept in mind that although all Danish IPO prospectuses over a

	Pharmaceutical and research[a]	IT and technology[b]	Trade and service[c]	Production	No. of IPOs
2001		3	1		4
2000	3	3	1		7
1999	1	4			5
1998	1	4	4	4	13
1997	1	1	1	1	4
1996	1		1	4	6
1995		2	4	4	10
1994			4		4
1993			1	1	2
1992				2	2
1991			3	2	5
1990			4	2	6
No. of IPOs	7	17	24	20	68

Notes:
[a] Pharmaceutical companies, biotechnological companies and other types of research companies; [b] software companies, hardware companies, internet companies and other kinds of IT and high-technological companies; [c] trade companies, wholesalers, banks and other kinds of service companies

Table III.
Number of prospectuses classified by type of business

12-year period have been included the small number of observations limits the conclusions that can be drawn.

Table V shows that the total amount of information has increased during the overall period within all categories. This development is especially predominant for the categories employees, strategic statements and R&D.

There is, however, a break point in the trend. Across all categories, there is a decrease in disclosure from 1999 to 2001. Using standard regression analysis and applying a trend dummy variable for the last two years, we found a significant difference in the slope. The regression analysis yields the equation:

$$\text{Disclosure}(Y_t) = \quad 3.48 + \quad 2.08^{*}t \; - 6.52^{*}D^{*}t + \varepsilon_t,$$

$$\text{T-test values :} \qquad (7.00) \quad (-2.47)$$

$$\text{where : } D = 0(t = 1990\text{-}1999) \text{ and } D = 1(t = 2000\text{-}2001)$$

A possible explanation is that until 1999 disclosure of information on intellectual capital was a simple way of signalling an attractive IPO in the same way that that the mere naming of companies as "dot.com" attracted investors (see Lee, 2001). However, after the tech stock crash, behavioural patterns might have changed so radically that even though there was not a great difference in the types of companies going public before and after the break point, after the break point there was measurable reluctance in disclosing the types of information that the "dot-com's" used to disclose.

Variables	Mean	Std. deviation	Min	Max	Variance
Disclosure	16.94	8.65	0	40	74.74
Size (no. of employees)	1,017,82	2,502,86	7	17,064	6,264.298
Age (years)	27.54	27.77	1	149	771.31
Managerial ownership prior to the IPO (%)	22.75	34.84	0	100	1,213,82

Table IV.
Descriptive statistics

Max. items Year	Employees (27)	Customers (14)	IT (5)	Processes (8)	R&D (9)	Strategic statements (15)	Total[a] (78)
2001	4.8	3.8	0.8	0.8	3.5	5.5	19.0
2000	7.3	3.0	0.3	1.9	4.0	5.0	21.4
1999	8.8	5.8	1.2	2.0	5.8	7.0	30.6
1998	6.6	4.8	0.8	1.6	1.8	5.4	21.1
1997	4.3	4.5	1.3	1.3	2.3	4.8	18.3
1996	4.2	3.5	1.2	1.5	2.2	4.3	16.8
1995	3.0	4.4	0.8	1.4	1.6	3.7	14.9
1994	5.0	3.5	1.3	0.3	0.5	2.5	13.0
1993	1.5	3.5	1.0	1.0	0.0	4.0	11.0
1992	2.0	4.0	0.5	0.5	1.5	3.0	11.5
1991	2.0	2.0	0.6	0.4	0.0	1.6	6.6
1990	2.3	2.2	0.8	0.3	0.3	1.8	7.8

Table V.
Average number of items per prospectus for each year

Note: [a] There are some minor variances in the cross-totals because of rounding errors

As indicated in Table VI, there is a difference in the level of information between the different industry categories. The number of observations is rather small, but the difference with respect to disclosure between so-called traditional sectors, i.e. manufacturing, commercial and service companies, and high-tech sectors, i.e. IT, technology, pharmaceutical and biological engineering is statistically significant. These differences are consistent with the studies by Cooke (1989, 1991) and Meek *et al.* (1995) who also concluded that the ratio of voluntary disclosure varies across industries. Since the number of Danish IPO prospectuses is limited it was decided to aggregate the initial four industries into two main sectors, the high-tech comprising and low-tech sectors for the remainder of the analysis.

Analysis of company characteristics influencing disclosure

An analysis of variance (ANOVA), controlling for technological type of the company (high-tech/low-tech), was used to test if the extent of managerial ownership before the IPO, company age and company size influenced disclosure. In order to conduct the ANOVA analysis, we divided the data on the independent variables into discrete groups in order to determine whether there is an effect on disclosure as the presumed dependent variable.

The extent of "managerial ownership before the IPO" was classified according the existence of such managerial ownership in the company at the time of IPO or not. This variable was thus measured as either "no pre-IPO managerial ownership" or "pre-IPO managerial ownership" in the cases where this was present. The variable 'company age' was measured in years and operationalised by distinguishing between young companies and old companies where enterprises aged less than 20 years were considered as young companies. Lastly, "company size" was treated by dividing the data into small companies – of less than 250 employees – and large companies – of 250 employees or more.

H1. *Industry differences*

The independent variable "technology type" has a significant influence on the extent of disclosure, high-tech companies disclosing almost twice as much information (31.7 per cent) as low-tech companies (16.4 per cent). It is not surprising that this variable is significant, as we were able to group our industrial categories according to this characteristic in the previous section. Moreover, this result may be compared to those of other studies indicating that investors and analysts engaged in knowledge-intensive industries – for example technological and pharmaceutical companies – find

	Employees	Customers	IT	Processes	R&D	Strategic statements	Total	Disclosure (%)
IT and technology ($n = 17$)	7.6	5.5	0.7	1.9	3.7	6.3	25.7	33.0
Pharmaceutical and research ($n = 7$)	5.3	2.0	0.7	1.3	6.8	5.3	21.5	27.6
Production ($n = 20$)	3.1	4.2	1.0	1.5	1.5	4.4	15.6	20.0
Trade and service ($n = 24$)	3.8	2.8	0.9	0.5	0.1	2.3	10.4	13.3

Table VI. Average amount of disclosure by industry and category

non-financial information especially relevant for estimating the value of these types of companies (Mavrinac and Boyle, 1996; Mavrinac and Siesfeld, 1997).

The difference between sectors also supports that companies with more intellectual capital need to disclose more voluntary non-financial information because increased information can help to reduce investors' uncertainty and, thereby, ensure that the company in question does not have to pay a high premium due to investors' perceived information risk. However, the difference could also be that industry norms for disclosure (see Gibbins *et al.*, 1990) affect the firm's disclosure as is suggested by Mather *et al.* (2000) who find industry differences in the use of graphs in Australian IPO prospectuses.

H2. *Managerial ownership*

The extent of management ownership before the IPO was also found to have significant influence on the amount of disclosure. Companies where management had an ownership share in the company at the time of listing on the stock exchange disclosed more information on intellectual capital. Note that this result is quite surprising and contrary to the literature previously cited (Demirag *et al.*, 2000; O'Sullivan, 2000). Our statistical analysis indicated that managerial ownership prior to the IPO had a positive effect on the companies' disclosure. A company where managerial ownership was present prior to the IPO disclosed on average 26.4 per cent as opposed to 17.1 per cent for the companies without managerial ownership before the IPO. The question of why this was the case cannot be answered within the context of this study. One possible explanation, however, might be that managers have a greater incentive to market the company, as the resulting lower cost of capital will directly affect their profit from the offering.

H3. *Company size*

The analysis did not find significant correlation between "company size" expressed in terms of number of employees and the extent of disclosure Since the number of observations is limited, the possible disconfirmation of Verrecchia's (1983) proprietary costs theory, furthermore confirmed by, e.g. Inchausti (1997), should be taken as a tentative conclusion. However, the results should be viewed in the light of the specific situation of the companies at the time of the publication of their IPO prospectuses. The companies in our study are about to be listed on the stock exchange, hence although they inevitably differ relative to company size, regardless of the size of the company, the flotation costs are very similar.

H4. *Company age*

Also, our analysis did not find any significant difference with respect to the independent variable "age". In relation to the perceived risk of investing in a company, age is a part of documenting that the company has been, and therefore in the future will be, able to sustain itself. Our results thus indicate that the history of the company does not matter to the capital market, although the track record of companies is continuously emphasized by capital market actors. This might indicate that it is the track record of present management team or the managing director, rather than the age of the company that matters. No previous studies have elaborated further on this aspect, wherefore it is an interesting avenue for further investigation.

Discussion

The results of our analyses lead us to three tentative conclusions. First, the results regarding industry differences supports the proposition that intangibles-intensive companies need to disclose more non-accounting information (*H1*). Possibly, in order to lower their risk premium. Second, there was an indication that management ownership creates incentives for greater disclosure (*H2*). This result was in opposition to previous findings, but could, possibly, be explained by the fact that the time of IPO, which is our specific focal point, is a unique case. The reasoning behind this is that management has a greater incentive to disclose information when they too will profit from the stock market listing. They are thus more interested in conveying the intrinsic value of the company to the stock market. Interestingly, this difference does not prevail for the high-tech companies – something that could have been expected – as the IPO profits generally are assumed to be greater there. Thus, we can also conclude that the technology factor weighs more than the ownership factor when it comes to the extent of disclosure.

The result that "size" (*H3*) and "age" (*H4*) are not significant individually contradicts a number of earlier studies (Ahmed and Courtis, 1999; Adrem, 1999; Kim and Ritter, 1999; Jaggi, 1997). Although it is important to note that our conclusion is based on a rather small dataset, it could indicate that there are other organizational characteristics, which are more decisive. Our analysis indicates that industry characteristics play a greater role in the assessment of how much information companies should disclose in order to facilitate the capital market's valuation analyses. The results indicate here that it is the old/large low-tech companies, which distinguish themselves from the other three possible categories. This result is in accordance with the cost of disclosure theory, which states that the costs for this type of company will be relatively lower.

Concluding remarks

Voluntary disclosure of information on intellectual capital in Danish IPO prospectuses has increased substantially in the last decade. This development can partly be related to the fact that relatively more IT and pharmaceutical companies have been listed on the Copenhagen Stock Exchange in the later years covered by our study, but also that the prospectuses of these types of companies generally include more information on intellectual capital. These results correspond to the suggestion in the literature that companies relying mainly on intangible assets for value creation – for example highly-educated staff, R&D, patents etc. – have to disclose more varied non-accounting information in order to reduce information asymmetry between management and external stakeholders.

Our analysis showed that grouping the companies into high-tech and low-tech sectors, revealed significant differences between high-tech and low-tech sectors with regard to the disclosure of voluntary non-accounting information. Likewise, the extent of management ownership before the IPO had a significant influence on the extent of voluntary non-accounting disclosure in the IPO prospectuses. On the other hand, age and company size were found insignificant. The four control variables included in the study relate to hypothesis regarding industry norms (*H1*) and the minimization of investor uncertainty (*H2, H3, H4*).

In relation to the future development of business reporting practices, DiPiazza and Eccles (2002) advocate for an approach that considers differences in relevance of information across industries as is also reflected in the industry differences that we find. Pre-IPO managerial ownership (*H2*) concerns the minimizing of uncertainty for potential investors as it indicates whether management has money on the line too. Our results indicate that when management has money on the line, they tend to disclose more information on intellectual capital.

An influence of size on the extent of disclosure could be evidence of the much-cited cost of disclosure theory (see Verrecchia, 1983). However, as our results were indecisive, they might indicate that the cost of disclosure theory does not have a significant importance in the present era of more advanced accounting systems and instant reporting. Finally, the variable age was indecisive as well. This might be attributed to the fact that analysts and investors do not regard the too distant past of the company important. Furthermore, the suggestion was made that perhaps it was not the age or track record of the company itself that mattered, but rather it was the track record of the existing management team that was the focus of the capital market. As these possible explanations could not be tested using the approach adopted in the study they can be suggested as areas for future research.

It is often stated that the current level of mandatory disclosure of information is not sufficient to convey a true picture of the company's present value and future prospects and that supplementary information on, e.g. intellectual capital should be disclosed. However, at the same time, there are reservations as to whether supplementary business reporting is a credible means of voluntary disclosure and whether indicators of such information are relevant. Therefore, this paper has focussed on the reporting of such non-accounting information in IPO prospectuses as information disclosed here was suggested to comprehend information that the capital market would find important. As firms issuing the IPO prospectus attempt to address the needs of the capital market, we believe that the actual disclosure practises in IPO prospectuses give insights into the capital market's need for information.

The disclosure of information on intellectual capital in IPO prospectuses, which has been the focus of this paper, indicates that companies and their advisors believe that this type of information is important in the capital market's assessment of the company's value. However, in order to be more specific about the motives behind the disclosure of intellectual capital, in IPO prospectuses and other supplementary reports, for example, intellectual capital statements, and about how this information will form the basis of the market's assessment of the company, it is necessary to look more directly at the work of the analysts and investors. This could be done using research interviews as was done, e.g. by Holland (2004) who provides evidence that both analysts and fund managers consider information on intellectual capital in their fundamental mosaic of information, which is the cornerstone of their discussions with and about the company.

Finally, a more detailed understanding of companies' motives for disclosure as well as analysts' and investors' need for information should make the link to the companies' cost of equity capital. Schrand and Verrecchia (2004) have demonstrated that greater disclosure frequency in the period prior to the IPO is associated with lower under-pricing as well as some of the more traditional measures of a companies' cost of capital such as bid-ask spread and analyst forecast dispersion also will be lower.

Moreover, Guo *et al.* (2004) provide evidence that the disclosure of information related to product development, patent protection and venture capital backing in biotech IPO prospectuses subsequently lowers bid-ask spread and share return volatility.

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