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Intellectual capital disclosure, cost of finance and firm value

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Abstract

Purpose – The purpose of this paper is to examine empirically the impact of web-based intellectual capital (IC) reporting on firm's value and its cost of finance.

Design/methodology/approach – A content-analysis of corporate web sites is conducted from four continental European countries (Belgium, France, Germany and The Netherlands) on the presence of IC information. Simultaneous regression modelling is used to control for endogeneity within a firm's disclosure strategy.

Findings – The data show that cross-sectional differences in the extent of IC disclosure are positively associated with firm value. Greater IC disclosure in continental Europe is associated with lower information asymmetry, lower implied cost of equity capital and lower rate of interest paid.

Research limitations/implications – The study is restricted to an analysis of firm's benefits of increased web-based disclosure without considering related costs.

Practical implications – The results of the study show that firms tend to benefit economically from better IC disclosure.

Originality/value – Existing evidence is extended by considering the capital market implications of IC related disclosure and web-based related disclosure.

Keywords Disclosure, Intellectual capital, Worldwide web, Internet, Western Europe

Paper type Research paper

1. Introduction

Prior literature tends to define intellectual capital (IC) as non-monetary assets or resources without physical substance, such as innovation, knowledge, research and development, employee training or customer satisfaction, underlying a firm's value creation process (Meritum, 2002; Lev and Zambon, 2003). The importance of IC resources in firm's value creation process has continuously increased due to the transition from manufacturing-based economies towards knowledge-based economies (Barth and Clinch, 1998; Kallapur and Kwan, 2004). IC is a key issue in strengthening a firm's competitive position and in achieving its objectives (Guthrie and Petty, 2000). The increased importance of IC results in a reduction of the valuation relevance of financial statement information since general accepted accounting standards hardly capture IC (Petty and Guthrie, 2000; Mouritsen *et al.*, 2001). Users (e.g. investors or



financial analysts) therefore increasingly demand firms to voluntarily disclose their intellectual resources to be able to judge firm's performance and value (Eccles *et al.*, 2001; Upton, 2001).

By content analysing annual reports, many studies observe that firms respond to users' request of providing IC information voluntarily (e.g. Guthrie and Petty, 2000; Brennan, 2001; Bozzolan *et al.*, 2003; Abdolmohammadi, 2005; Vandemaele *et al.*, 2005; Cerbioni and Parbonetti, 2007). However, the advent of the Internet brings firms to reconsider their disclosure strategy as it allows for direct communication with their stakeholders. Striukova *et al.* (2008) find that UK firms disclose more than one-third of their IC on their web sites. Firms use the internet extensively to provide detailed and timely information for a larger group of existing and potential investors (Ettredge *et al.*, 2001; Bollen *et al.*, 2006). The internet allows firms to better control their reporting strategies as they are less dependent on intermediaries such as journalists or financial analysts for the diffusion of their message (Lymer, 1999). Internet reporting also reduces dissemination costs (Geerings *et al.*, 2003). Many studies examine the extent and the drivers of IC disclosure, but our knowledge is scarce about the benefits firms realize by producing IC information voluntarily (Wyatt, 2008). Our paper extends existing evidence by studying web-based IC reporting behaviour for a sample of continental European firms and by empirically testing whether cross-sectional variation in the extent of web-based IC reporting is associated with cross-sectional variation in firm value and cost of finance. If IC disclosure is economically relevant, we expect it to affect a firm's cost of finance and to contribute to a firm's value creation. IC disclosure would be economically worthwhile if it is associated with lower average return expected by all investors of a firm. The expected return of debt investors, or the cost of debt, is relatively easy to calculate as it is composed of the rate of interest paid. Cost of equity is more challenging to compute as equity does not pay a set return to its investors. In this regard, we use different proxies for the cost of equity. To capture a firm's value creation, the market valuation of a firm is measured over the value of firm tangible assets (Tobin's q).

Our focus on continental European countries is contextualized by low quality of mandated financial disclosure, low levels of legal enforcement, and higher levels of earnings management (La Porta *et al.*, 1998; Leuz *et al.*, 2003), increasing investor need for voluntary disclosure in order to complement financial statements. Our findings show that firms with greater IC disclosure benefit from a lower level of information asymmetry, a lower cost of equity capital and a lower cost of debt capital and exhibit a higher firm value.

The remainder of the paper is structured as follows. Section 2 reviews prior literature and includes our hypotheses. Section 3 discusses the research design and Section 4 presents the results of the empirical analyses. Section 5 summarises the paper and provides some questions for further research.

2. The relevance of IC information and hypothesis development

The transition towards knowledge-based economies increases the role of IC resources in the value creation process of firms (Holland, 2003). This transition has increased the level of information asymmetry between capital market participants and corporate managers and increased the debate about the methods to integrate IC in business reporting. Various frameworks including IC metrics that reflect firm's activities are proposed, such as the intangible asset monitor classifying intellectual capital into

internal structure, external structure and competence of personnel (Sveiby, 1997), the Skandia Value Scheme including structural capital and human capital (Edvinsson and Malone, 1997) and the balanced scorecard integrating the concepts learning and growth, internal processes, customers and financial information (Kaplan and Norton, 2004).

Following Kaplan and Norton's (2004) framework, we observe in the literature growing evidence that IC performance measurements related to this framework have an impact on value creation. For example, from a learning and growth perspective, Lin and Lin (2006) find that employee learning and training as well as teamwork are key drivers underlying customer value creation in firms. From an internal perspective, Xu *et al.* (2007) find that biotech firms with more extensive drug development portfolios have enhanced revenue opportunities and, consequently, higher stock market valuations. From a customer perspective, Ittner and Larcker (1998) and Anderson *et al.* (2004) show that customer satisfaction and loyalty are useful predictors of firms' future financial performance and, ultimately, value creation. Smith and Wright (2004) report that product value attributes directly and differentially influence levels of customer loyalty as well as the prevailing average selling prices. From a financial perspective, Said *et al.*'s (2003) findings support the contention that firms employing a combination of financial and non-financial performance measures in their compensation contracts have significantly higher mean levels of returns on assets and higher levels of market returns.

These studies however do not allow us to conclude whether disclosure about IC resources influences firm value. Hassan *et al.* (2009) state that disclosure is a mechanism to mitigate agency costs arising from the possibility that managers may not act in the best interest of shareholders. Knowing that IC resources are key drivers of the firm's value creation process, disclosure of these resources helps investors to better monitor management. Merton (1987) in his theoretical model asserts that the investors' business comprehension increases with disclosure, lowering the investor risk perception and thus increasing firm value. Mechanisms allowing investors to increase their ability in firm monitoring, as disclosures, increase firm performance and firm value (Healy and Palepu, 1993; Pagano *et al.*, 2002; Reese and Weisbach, 2002). In an empirical study, Klein *et al.* (2005) observe that firm value increases with greater corporate governance disclosures. Hence, we expect that voluntary web-based IC disclosure has a positive effect on firm value, leading to the following hypothesis:

H1. Firm value is positively associated with the level of IC disclosures on its corporate web site.

Second, we examine whether firm's cost of finance is associated with its extent of IC disclosure. Economic theory argues that increased voluntary disclosure has a negative impact on firm's cost of finance (Diamond, 1985; Glosten and Milgrom, 1985; Gibbins *et al.*, 1990; Diamond and Verrecchia, 1991; Lundholm and Van Winkle, 2006). First, better quality information allows investors to make more accurate estimates of the parameters underlying the future stock returns, decreasing nondiversifiable estimation risk and uncertainty about future cash flows and future profitability (Barry and Brown, 1985; Handa and Linn, 1993; Clarkson *et al.*, 1996). Second, an enhancement in the extent of disclosure leads to lower transaction costs. Improved disclosure increases the willingness for investors to trade, increases the shares' liquidity and decreases cost of finance (Glosten and Milgrom, 1985; Diamond and Verrecchia, 1991; Easley and

O'Hara, 2004). Empirical studies confirm the negative association between the cost of finance and the extent of disclosure to a large extent. Welker (1995), Healy *et al.* (1999) and Zhang and Ding (2006) demonstrate that information asymmetry decreases with an increase in voluntary disclosure. Botosan and Plumlee (2002), Hail (2002), Poshakwale and Courtis (2005) and Cheng *et al.* (2006) show an inverse association between the cost of equity capital and the financial analysts' evaluation of annual report disclosure. Sengupta (1998) and Nikolaev and van Lent (2005) find that the interest rate paid is negatively related to analysts' perception of disclosure quality. Botosan (1997) and Richardson and Welker (2001) show that only firms with low analyst following benefit from a decrease in their implied cost of equity capital with greater disclosure since greater analyst coverage substitutes for the information provided by firms. However, Richardson and Welker (2001) and Botosan and Plumlee (2002) find a positive association between cost of equity capital and extent of voluntary disclosure. As voluntary disclosure is considered as a response to information asymmetry between management and investors, we posit that this association also holds for web-based IC disclosure. Investors experience less uncertainty with better disclosure, resulting in lower risk premiums. This gives rise to following hypothesis:

H2. Firm's cost of finance is negatively associated with the level of IC disclosures on its corporate website.

3. Research design

We analyse the content of corporate web sites on the presence of IC information. Our sample consists of 267 non-financial listed firms from continental Europe split into 43 Belgian firms, 43 Dutch firms, 97 French firms and 84 German firms, being the largest ones in each country. We classify each firm into eight industries according to their S&P classification: Consumer goods and services, Energy, Chemicals and drugs, Industrials, Information technology, Materials (resources), Telecom and media, and Utilities. Data collection took place in the summer of 2002.

We focus on voluntary IC disclosure available from a corporate website in HTML format since it is comprehensive and accessible to all shareholders at low cost. The HTML web pages of the sample firms are analysed on the presence of IC information following a disclosure scheme that is based on IC indicators derived from Kaplan and Norton (1996), Ittner and Larcker (1998) and Robb *et al.* (2001). The disclosure index consists of 42 IC information items classified into following three categories:

- (1) Customer value (16 items).
- (2) Human capital (16 items).
- (3) Internal capital (10 items).

Appendix 1 presents the individual items included in each category. Each item gets a weighted score depending on the degree of detail. We allocate a score of three for an item that is described in quantitative terms, a score of 2 for an item that is specifically described, and a score of one for an item discussed in general. The aggregate score is the sum of the scores for these three categories. The reliability of the IC scores is checked by making use of the Cronbach's alpha score. We obtain the value of 0.82 for this metric, exceeding the acceptable level of reliability, which has traditionally been set at 0.70 or higher (Nunnally, 1978).

We proxy firm value as Tobin's q computed as the book value of total assets minus the book value of equity added with the market value of equity in the numerator and the book value of total assets in the denominator at year-end 2002. We measure cost of finance alternatively by means of the extent of information asymmetry, the implied cost of equity capital and the cost of debt capital. Level of information asymmetry is measured by means of trading volume and bid-ask spread. Trading volume is computed as the median daily turnover (i.e. volume of shares traded multiplied with stock price and divided by market capitalisation) in 2003. Bid-ask spread is measured as the median of the daily difference between bid-price and ask-price scaled by the average of the bid-price and ask-price in 2003. Implied cost of equity capital is based on the Easton (2004) approach and is measured as the inverse of the price-earnings-growth ratio which is the square root of the difference between the average analysts' earnings per share forecasts for year-end 2003 and year-end 2004 (made in May 2003) scaled by stock price at year-end 2002. Cost of debt capital equals the interest rate measured as the ratio between the interest expenses in 2003 and the sum of the long- and short-term financial debt at the beginning of 2003.

The association of web-based IC disclosure with firm value and cost of finance respectively is assessed using simultaneous regression techniques in order to cope with endogeneity in the disclosure strategy. We explicitly control for other factors affecting firm value by including firm-specific variables, analyst properties and industry and country dummies in the regression models. Variable selection and variable specification is done in line with prior literature. In order to investigate the effect of the extent of IC disclosure on firm value, we regress the following model:

$$\text{Firm value} = f(\text{IC disclosure, analyst following, analysts' forecast dispersion, size, leverage, ownership structure, profitability, industry dummies, country dummies})$$

Key control variables with regard to the information environment of the firm are analyst following and analysts' forecast dispersion. In the empirical literature on firm value, analyst following is used as a proxy for the quality of a firm's information environment and for the extent of corporate financial information that is publicly available (Imhoff and Lobo, 1992; Roulstone, 2003). In that sense, analyst following is an efficient proxy to control for other information sources affecting firm value. We assume to observe a positive association between firm value and analyst following. Analysts' forecast dispersion is a proxy for the ex ante risk and it is assumed to have a negative impact on firm value (Chung and Jo, 1996). Larger firms have a lower firm value since the activities of these firms are more diversified (Chung and Jo, 1996; Chen and Steiner, 2000; Lang *et al.*, 2004; Klein *et al.*, 2005; Chen *et al.*, 2006; Ghosh, 2007). We expect a negative association between Tobin's q and leverage as the latter is a proxy for financial risk (Klein *et al.*, 2005; Chen *et al.*, 2006). A high level of ownership concentration gives rise to larger agency problems since it reduces the ability of investors to monitor the firm effectively, decreasing firm value (Lang *et al.*, 2004). Profitability tends to be positively related to Tobin's q since more profitable firms are less risky (Chung and Jo, 1996; Chen and Steiner, 2000; Chen *et al.*, 2006; Ghosh, 2007). Finally, we control for industry- and country-effects.

Similar to other studies (Chen and Steiner, 2000; Lang *et al.*, 2004), we use a three-stage-least square (3SLS) analysis since firm value, extent of IC disclosure and analyst following are endogenous variables. We associate the extent of IC disclosure

with analyst following, firm value, leverage, profitability, capital investment intensity and media exposure. Higher analyst following imposes more pressure on firms to disclose more extensively (Lang and Lundholm, 1996). We further assume that firm value and extent of IC disclosure have a positive association according to the signalling theory. Leverage could have a positive association (due to higher agency costs) as well as a negative association (due to a lack of financial resources to cover reporting costs) with the extent of IC disclosure (Inchausti, 1997; Watson *et al.*, 2002; Cormier and Magnan, 2003). Firm profitability could affect the extent of IC disclosure both positively and negatively. Signalling theory suggests that more profitable firms disclose more to inform their stakeholders about their good performance, but based on agency cost theory, less profitable firms disclose more to contextualise their worse financial performance (Inchausti, 1997). Capital investment intensity proxies for the barriers to entry of a firm, suggesting that firms with low barriers to entry report less information because new entrants may worsen a firm's competitive position (Dong and Antonakis, 2007). Media exposure is a proxy for firm's visibility in society (Cormier and Magnan, 2003) and is expected to be positively associated with the extent of IC disclosure.

Analyst following is regressed on firm value, size, ownership structure, the number of stock exchange listings and systematic risk. Firm value is indication of firm quality. A higher firm value is expected to attract a larger number of financial analysts (Chung and Jo, 1996). We assume that analyst following is positively related to size since larger firms generate more transaction profits (Healy *et al.*, 1999; Ackert and Athanassakos, 2003). Firms with a more diversified ownership structure as well as cross-listed firms are more attractive to cover (Baker *et al.*, 2002; Lang *et al.*, 2003). Financial analysts prefer to cover firms with a higher level of uncertainty since investors rely on analyses, recommendations and information provided by financial analysts to a larger extent (Bhushan, 1989; Ackert and Athanassakos, 2003).

For the cost of finance regression models, we distinguish level of information asymmetry, implied cost of equity capital and cost of debt capital proxies. We use the following regression models:

Information asymmetry = f(IC disclosure, size, leverage, number of stock exchange listings, stock price volatility, ownership structure, industry dummies, country dummies)

Implied cost of equity capital = f(IC disclosure, size, leverage, number of stock exchange listings, analysts' forecast dispersion, market-to-book, negative earnings, earnings variability, systematic risk, industry dummies, country dummies)

Cost of debt capital = f(IC disclosure, size, leverage, analysts' forecast dispersion, market-to-book, negative earnings, earnings variability, industry dummies, country dummies)

Previous studies (Botosan, 1997; Sengupta, 1998; Hail, 2002; Brown *et al.*, 2004) find that cost of finance is negatively associated with size. Smaller firms are more difficult to monitor, resulting in a higher level of information asymmetry and a higher cost of equity/debt capital. We expect that all proxies for the cost of finance are positively

associated with leverage as it indicates higher risk (Sengupta, 1998; Khurana and Raman, 2004; Cheng *et al.*, 2006). The number of stock exchange listings controls for the quantity and quality of the information provided by the firm, suggesting a negative association with the level of information asymmetry and the implied cost of equity capital (Lang *et al.*, 2003). Two control variables, stock price volatility and ownership structure, are related only to the level of information asymmetry. Stock price volatility is assumed to have a positive association with the level of information asymmetry as it proxies for investors' uncertainty (Tkac, 1999; Huang, 2004). Dominance of a firm by one or a few shareholders is an indication of higher information asymmetry since these shareholders may have superior access to corporate information (Leuz and Verrecchia, 2000).

For the implied cost of equity and debt capital, we include financial analysts' forecast dispersion as a control variable as it proxies for the level of uncertainty perceived by financial analysts. We assume a negative association between these cost of finance proxies and the dispersion in the financial analysts' earnings forecasts (Khurana and Raman, 2004; Mikhail *et al.* 2004; Cheng *et al.*, 2006). Since lower market-to-book ratios reflect higher uncertainty about the firm's future growth opportunities, a negative association between this variable and the implied cost of equity capital and cost of debt capital is assumed (Sengupta, 1998; Khurana and Raman, 2004; Mikhail *et al.* 2004; Cheng *et al.*, 2006). Brown (2001) suggests that investors face more difficulties to assess firms with negative earnings since such firms tend to manipulate their earnings to a larger extent, increasing uncertainty and increasing cost of equity and debt capital. Earnings variability indicates higher uncertainty about the persistence of future earnings (Jaggi and Jain, 1998; Graham *et al.*, 2005), increasing cost of equity and debt capital. Botosan (1997), Khurana and Raman (2004) and Mikhail *et al.* (2004) demonstrate that the level of systematic risk, proxied by the beta coefficient, has a positive association with the implied cost of equity capital. All equations on the cost of finance include dummy variables to control for industry and country influences.

We take into account the endogenous association between cost of finance and IC disclosure as suggested in prior literature (Welker, 1995; Leuz and Verrecchia, 2000; Nikolaev and van Lent, 2005). We use the two-stage-least square (2SLS) method to associate cost of finance with the extent of IC disclosure. The first stage of the 2SLS method estimates the extent of IC disclosure based on exogenous variables of the cost of finance equations together with instrumental variables. The second stage relates the estimated value of the extent of IC disclosure with the cost of finance proxies. Instrumental variables selected in our analysis of the implied cost of equity capital and cost of debt capital are media exposure, capital investment intensity and ownership. The latter variable is not included as instrumental variable in the equation related to the extent of information asymmetry. We expect that the extent of IC disclosure is increasing with dispersed ownership structures as the agency theory posits that firms with dispersed ownership structures have more conflicts of interests between managers and shareholders (Depoers, 2000). We have already discussed the expected influences of capital investment intensity and media exposure on the extent of disclosure previously.

Table I presents the measurement of the independent variables used in our analysis. The data to measure both dependent and independent variables are collected from the Worldscope and IBES databases (as included in Datastream). These databases also

| Description | Measurement |
|-----------------------------------|--|
| IC disclosure | Extent of IC information disclosed on the corporate web site in 2002 including customer value, human capital and internal capital |
| Analyst following | Number of financial analysts following a firm in 2002 |
| Firm value | Tobin's q is measured as the book value of total assets minus the book value of equity added with the market value of equity scaled by the book value of total assets at year-end 2002 |
| Analysts' forecast dispersion | Standard deviation of the financial analysts' earnings forecasts made for 2003 scaled by the average financial analysts' earnings forecasts |
| Size | Logarithm of total assets in 2002 |
| Leverage | Total debt scaled by total assets in 2002 |
| Ownership structure | Dummy variable representing 1 if an investor possesses more than 20 per cent of firm's shares in 2002 and 0 otherwise |
| Profitability | Net results scaled by total assets in 2002 |
| Capital investment intensity | Total fixed assets scaled by total assets in 2002 |
| Media exposure | Average number of articles in international publications that are surveyed by ABI-Inform for the period 1997-2001 |
| Number of stock exchange listings | Sum of the number of stock exchange listings in 2002. We assign a value of 1.5 for each listing on either an US stock exchange or the London Stock Exchange, and a value of 1 for each listing on another stock exchange |
| Systematic risk | Beta coefficient in 2002 |
| Stock price volatility | Standard deviation of the daily stock price returns in 2003 |
| Market-to-book | Logarithm of the ratio between market capitalisation and book value of equity of a firm in 2002 |
| Negative earnings | Dummy variable representing 1 if a firm has negative earnings in 2002 and 0 otherwise |
| Earnings variability | Logarithm of the percentage change in earnings per share between 2002 and 2001 |

Table I.
Measurement of the independent, control and instrumental variables

provide financial data to compute the control and instrumental variables included in the regression models. Due to missing values and outliers, the sample size of our regressions ranges between 208 and 228 cases.

4. Research findings

Table II provides mean statistics for the variables used in our analyses. This table exhibits that French firms obviously present a larger amount of IC information on their corporate websites compared to other continental European firms. This result is consistent when breaking down the IC aggregate score on the three information categories. Our sample firms provide, on average, more customer value information than human capital or internal capital information. Table II also shows that German firms are larger. French and German firms are generally traded on a larger number of foreign stock exchanges and are more present in the media compared with Belgian and Dutch firms. Ownership is more diversified in French firms compared to the other continental European firms.

Table III provides the multivariate research findings relating firm value, extent of IC disclosure and analyst following.

Table II.
Mean statistics of the
variables included in our
analyses

| | Continental Europe (n = 267) | Belgium (n = 43) | France (n = 97) | Germany (n = 84) | The Netherlands (n = 43) |
|-----------------------------------|---------------------------------|---------------------|--------------------|---------------------|-----------------------------|
| <i>Dependent variables</i> | | | | | |
| Trading volume | 1.909 | 1.729 | 3.132 | 1.244 | 3.613 |
| Bid-ask spread | 0.011 | 0.022 | 0.005 | 0.017 | 0.006 |
| Implied cost of equity capital | 0.144 | 0.125 | 0.136 | 0.145 | 0.178 |
| Cost of debt capital | 0.069 | 0.058 | 0.051 | 0.094 | 0.071 |
| Firm value | 1.654 | 1.940 | 1.676 | 1.438 | 1.733 |
| <i>Independent variables</i> | | | | | |
| IC disclosure | 23.637 | 11.534 | 37.454 | 18.333 | 14.930 |
| Customer value disclosure | 10.438 | 4.698 | 17.381 | 7.119 | 7.000 |
| Human capital disclosure | 7.918 | 4.651 | 10.485 | 7.643 | 5.930 |
| Internal capital disclosure | 5.281 | 2.186 | 9.587 | 3.571 | 2.000 |
| Analyst following | 14.919 | 7.861 | 16.719 | 13.987 | 18.947 |
| Analysts' forecast dispersion | 0.676 | 0.440 | 0.829 | 0.847 | 0.196 |
| Size ^a | 15.343 | 8.449 | 13.989 | 22.933 | 10.557 |
| Leverage | 0.629 | 0.557 | 0.629 | 0.650 | 0.662 |
| Ownership structure | 0.706 | 0.814 | 0.480 | 0.916 | 0.721 |
| Profitability | 0.037 | 0.050 | 0.025 | 0.058 | 0.008 |
| Capital investment intensity | 0.417 | 0.423 | 0.482 | 0.361 | 0.371 |
| Media exposure | 8.836 | 1.357 | 13.810 | 10.143 | 2.023 |
| Number of stock exchange listings | 2.556 | 1.140 | 3.040 | 3.071 | 1.857 |
| Systematic risk | 0.715 | 0.342 | 1.100 | 0.487 | 0.635 |
| Stock price volatility | 0.026 | 0.020 | 0.025 | 0.027 | 0.032 |
| Market-to-book | 2.531 | 2.291 | 2.753 | 2.525 | 2.264 |
| Negative earnings | 0.167 | 0.140 | 0.210 | 0.107 | 0.209 |
| Earnings variability | 2.857 | 7.973 | 1.757 | 1.404 | 3.141 |

Notes: This table contains mean statistics for the dependent and independent variables across the sample firms; ^a numbers in millions of euro

| | Firm value | IC disclosure | Analyst following |
|---|-------------|---------------|-------------------|
| <i>Panel A: Total IC disclosure</i> | | | |
| Intercept | 5.545 *** | 4.712 | - 43.594 *** |
| Total IC disclosure | 0.009 * | | |
| Analyst following | 0.030 ** | 0.648 *** | |
| Firm value | | 7.891 ** | 2.653 |
| Analysts' forecast dispersion | - 0.021 | | |
| Size | - 0.217 *** | | 2.261 *** |
| Leverage | 0.260 | - 4.442 | |
| Ownership structure | - 0.053 | | - 1.021 |
| Profitability | 3.060 *** | - 30.121 * | |
| Capital investment intensity | | 5.852 | |
| Media exposure | | 0.110 ** | |
| Number of stock exchange listings | | | 0.906 *** |
| Systematic risk | | | 3.510 *** |
| Industry dummies | Included | | |
| Country dummies | Included | | |
| R ² (%) | 37.8 | 12.2 | 41.9 |
| <i>Panel B: Customer value disclosure</i> | | | |
| Intercept | 5.118 *** | 2.026 | - 43.510 *** |
| Customer value disclosure | 0.022 ** | | |
| Analyst following | 0.029 ** | 0.146 | |
| Firm value | | 6.248 *** | 2.794 |
| Analysts' forecast dispersion | - 0.019 | | |
| Size | - 0.197 *** | | 2.239 *** |
| Leverage | 0.252 | - 3.221 | |
| Ownership structure | - 0.061 | | - 0.713 |
| Profitability | 3.264 *** | - 31.561 ** | |
| Capital investment intensity | | 2.280 | |
| Media exposure | | 0.049 ** | |
| Number of stock exchange listings | | | 0.968 *** |
| Systematic risk | | | 3.323 *** |
| Industry dummies | Included | | |
| Country dummies | Included | | |
| R ² (%) | 34.9 | 8.6 | 42.1 |
| <i>Panel C: Human capital disclosure</i> | | | |
| Intercept | 6.194 | 1.433 | - 44.575 *** |
| Human capital disclosure | 0.017 | | |
| Analyst following | 0.039 *** | 0.300 *** | |
| Firm value | | - 0.740 | 2.925 |
| Analysts' forecast dispersion | - 0.029 | | |
| Size | - 0.245 *** | | 2.294 *** |
| Leverage | 0.195 | 4.201 | |
| Ownership structure | - 0.047 | | - 0.982 |
| Profitability | 2.781 *** | 9.072 | |
| Capital investment intensity | | 0.550 | |
| Media exposure | | 0.016 | |
| Number of stock exchange listings | | | 0.929 *** |
| Systematic risk | | | 3.258 *** |
| Industry dummies | Included | | |
| Country dummies | Included | | |
| R ² (%) | 36.1 | 6.3 | 42.1 |

(continued)

Table III.
3SLS regression results
between firm value, IC
disclosure and analyst
following

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| | Firm value | IC disclosure | Analyst following |
|---|------------|---------------|-------------------|
| <i>Panel D: Internal capital disclosure</i> | | | |
| Intercept | 5.500 | 0.935 | -40.014*** |
| Internal capital disclosure | 0.032* | | |
| Analyst following | 0.029** | 0.213 | |
| Firm value | | 2.438*** | 2.196 |
| Analysts' forecast dispersion | -0.023 | | |
| Size | -0.216*** | | 2.133*** |
| Leverage | 0.439** | -5.336** | |
| Ownership structure | -0.054*** | | -1.343 |
| Profitability | 3.092 | -7.800** | |
| Capital investment intensity | | 3.205 | |
| Media exposure | | 0.029** | |
| Number of stock exchange listings | | | 0.963*** |
| Systematic risk | | | 3.454*** |
| Industry dummies | Included | | |
| Country dummies | Included | | |
| R ² (%) | 38.2 | 13.6 | 41.5 |

Notes: This table reports the beta coefficients; ***, **, * indicates statistical significance at the 1 per cent, 5 per cent and 10 per cent levels respectively; $n = 216$

Table III.

We observe that firm value is positively associated with IC disclosure, hence supporting *H1*. This suggests that firms are able to improve firm value by disclosing more about their IC resources. Some control variables show the expected effect: firm value increases in profitability and in analyst following, and decreases in firm size. The results further show that the extent of IC disclosure is positively associated with analyst following, firm value and media exposure. Less profitable firms disclose more IC information as well. Consistent with expectations, we find that analyst following is increasing in firm size, the number of stock exchange listings and systematic risk. Substituting the aggregate score on IC information with the disclosure scores on the three IC information categories, we find that firm value enhances with an increase in the reporting of customer value information and internal capital information. Firm value is unrelated with human capital disclosure (Table III, Panel B-D). Generally, the control variables show similar associations as discussed previously, with exception of the 3SLS regression results related to human capital disclosure.

We present the multivariate regression results of the association between firm's cost of finance and the extent of IC disclosure in Table IV.

Panel A of Table IV indicates that trading volume increases and bid-ask spread decreases when firms provide more IC information. These results support *H2*. With regard to the control variables, we observe that both trading volume and bid-ask spread are positively associated with stock price volatility. Firms with dispersed shareholdings experience a higher trading volume and a lower bid-ask spread. Bid-ask spread is also negatively related with size. Table IV (Panel A) illustrates a significant negative association between the implied cost of equity capital and extent of IC disclosure. Cross-sectional differences in the cost of debt capital are negatively related with the extent of IC disclosure as well. These findings allow us to confirm *H2*. Several control variables show the expected association. The implied cost of equity capital is increasing with the dispersion in the analysts' earnings forecasts, with larger

| | Trading volume (n = 212) | Bid-ask spread (n = 208) | Implied cost of equity capital (n = 223) | Cost of debt capital (n = 228) |
|---|-----------------------------|-----------------------------|---|-----------------------------------|
| <i>Panel A: Total IC disclosure</i> | | | | |
| Intercept | -2.886 *** | 2.505 *** | 15.549 ** | 10.768 *** |
| Total IC disclosure | 0.080 *** | -0.030 *** | -0.231 ** | -0.067 ** |
| Size | 0.119 | -0.081 ** | -0.116 | -0.136 |
| Leverage | 0.257 | 0.262 | -0.322 | -0.023 |
| Number of stock exchange listing | -0.084 | -0.012 | -0.176 | |
| Stock price volatility | 58.009 *** | 16.124 *** | | |
| Ownership structure | -1.402 | 0.158 | | |
| Analysts' forecast dispersion | | | 0.817 ** | 0.035 |
| Market-to-book | | | -3.748 *** | 1.131 |
| Negative earnings | | | 5.722 *** | -0.197 |
| Earnings variability | | | 0.088 | 0.765 ** |
| Systematic risk | | | 5.749 *** | |
| Industry dummies | Included | Included | Included | Included |
| Country dummies | Included | Included | Included | Included |
| R ² (%) | 27.6 | 34.5 | 42.0 | 5.7 |
| F-value | 6.305 *** | 8.134 *** | 7.769 *** | 1.898 * |
| <i>Panel B: Customer value disclosure</i> | | | | |
| Intercept | -5.084 *** | 3.271 *** | 23.578 | 12.741 *** |
| Customer value disclosure | 0.165 *** | -0.059 *** | -0.262 * | -0.146 ** |
| Size | 0.233 *** | -0.123 | -0.571 ** | -0.218 * |
| Leverage | -0.161 | 0.472 | 2.127 | 0.185 |
| Number of stock exchange listing | -0.090 | -0.013 | -0.112 | |
| Stock price volatility | 61.686 *** | 15.417 *** | | |
| Ownership structure | -1.673 | 0.243 | | |
| Analysts' forecast dispersion | | | 0.820 ** | 0.058 |
| Market-to-book | | | -4.930 *** | 0.826 |
| Negative earnings | | | 5.700 *** | -0.202 |
| Earnings variability | | | -0.162 | 0.704 |
| Systematic risk | | | 5.459 *** | |
| Industry dummies | Included | Included | Included | Included |
| Country dummies | Included | Included | Included | Included |
| R ² (%) | 37.1 *** | 26.9 | 45.0 | 5.6 |
| F-value | 9.031 *** | 6.860 *** | 8.798 *** | 1.867 * |

(continued)

Table IV.
2SLS regression results
between cost of finance
and IC disclosure

Table IV.

| | Trading volume (<i>n</i> = 212) | Bid-risk spread (<i>n</i> = 208) | Implied cost of equity capital (<i>n</i> = 223) | Cost of debt capital (<i>n</i> = 228) |
|---|-------------------------------------|--------------------------------------|---|---|
| <i>Panel C: Human capital disclosure</i> | | | | |
| Intercept | 3.614 | -0.506 | 7.402 | 7.443 |
| Human capital disclosure | 0.344** | -0.153** | -0.738** | -0.258** |
| Size | -0.207 | 0.079 | 0.271 | 0.003 |
| Leverage | 0.166 | 0.149 | 2.583 | 0.808 |
| Number of stock exchange listing | 0.022 | -0.051* | -0.389* | |
| Stock price volatility | 35.179** | 25.976** | | |
| Ownership structure | -1.156** | 0.073 | | |
| Analysts' forecast dispersion | | | 1.050** | 0.029 |
| Market-to-book | | | -4.150*** | 1.168 |
| Negative earnings | | | 5.485*** | -0.208** |
| Earnings variability | | | 0.172 | 0.818 |
| Systematic risk | | | 6.699*** | |
| Industry dummies | Included | Included | | Included |
| Country dummies | Included | Included | | Included |
| <i>R</i> ² (%) | 20.0 | 12.7 | 31.6 | 4.7 |
| <i>F</i> -value | 3.830*** | 2.172*** | 4.957*** | 1.543* |
| <i>Panel D: Internal capital disclosure</i> | | | | |
| Intercept | -4.463** | 3.167*** | 14.088* | 11.091*** |
| Internal capital disclosure | 0.270*** | -0.095*** | -0.975** | -0.182** |
| Size | 0.200** | -0.115*** | -0.094 | -0.179 |
| Leverage | 0.946 | 0.015 | -5.956 | -0.565 |
| Number of stock exchange listing | -0.156** | 0.013 | 0.085 | |
| Stock price volatility | 70.726*** | 10.873** | | |
| Ownership structure | -1.200*** | 0.088 | | |
| Analysts' forecast dispersion | | | 0.480 | -0.002 |
| Market-to-book | | | -1.365 | 1.297 |
| Negative earnings | | | 5.742*** | -0.232** |
| Earnings variability | | | 0.437 | 0.802 |
| Systematic risk | | | 4.932*** | |
| Industry dummies | Included | Included | | Included |
| Country dummies | Included | Included | | Included |
| <i>R</i> ² (%) | 33.4 | 29.2 | 35.6 | 5.1 |
| <i>F</i> -value | 7.680*** | 6.151*** | 5.944*** | 1.710* |

Notes: This table reports the beta coefficients; ***, **, * indicates statistical significance at the 1 per cent, 5 per cent and 10 per cent levels respectively

systematic risk and with negative earnings. The level of growth opportunities is negatively correlated with the implied cost of equity capital.

Our results further indicate that cost of debt capital is positively influenced by earnings variability. Breaking down the IC disclosure category into the three components, the results in Table IV (Panel B to D) exhibit significant associations between the proxies for the firm's cost of finance and all three IC disclosure components.

In order to quantify the potential reduction effect of increased IC disclosure on the cost of equity capital we replicate the cost of equity regressions from Table IV using an OLS routine. The coefficient for total IC disclosure has the value of 0.04 which indicates that a 1 per cent increase in the extent of IC disclosure is associated with a reduction in the firm's cost of equity capital of 0.04 per cent. This suggests that, holding other parameters constant, a firm improving its disclosures with 10 per cent points is related with a decrease in their cost of equity capital with 0.4 per cent points. With a market capitalization of \$100 million, this result implies a reduction in the required return of \$0.4 million.

5. Conclusion

This paper studies the economic benefits of a web-based IC disclosure strategy for a sample of large continental European listed firms. We extend existing evidence by focusing on the corporate websites as a medium to disclose IC information and by examining whether firm value and cost of finance are associated with the extent of IC disclosure. We observe that a continental European firm with better IC disclosure enjoys a larger firm value and a lower cost of finance. These findings suggest that better IC disclosure increases investors' willingness to commit financial resources.

Our research findings have practical implications. The current paper provides evidence that firms tend to benefit from greater IC disclosure. Our results support the idea that financial analysts and investors use corporate IC disclosure to support their investment decisions. The significant association between IC disclosure and all proxies for the cost of finance in continental Europe suggests that voluntary IC disclosure is useful to inform investors and financial analysts. Capital market participants in continental Europe need IC information to add value to financial statement information in order to assess firm value and future profitability.

One limitation of our study deals with our choice to use a self-created disclosure index. However, the reliability test is satisfactorily. In addition, we do not take into account differences in regulation on the measurement of interest expenses and debt financing when computing cost of debt capital. A longitudinal study of the association between the cost of finance and the extent of IC disclosure is also required in order to take into account changes in the IC reporting strategy. Future studies could also focus on the benefits that firms receive from other stakeholders such as suppliers, customers or employees with an increase in the extent of IC disclosure. Firms may attain better trading conditions by reducing the uncertainty for these stakeholders. Our results document the valuation relevance of improved IC disclosure, but a trade-off has to be made between the costs of disclosure, such as collection or dissemination costs and proprietary costs and the economic benefits. This is a topic for further research.

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Appendix 1

| Customer value | Human capital | Internal capital |
|---|--|---|
| Product description | Hiring/ new employees | Sales – new products |
| Quality/ up-to-date technology | Qualification/expertise | Market share – new products |
| Reliability: errors/return | Training | Awards |
| Price | Description of job requirements | Investments in R&D |
| Delivery time | Employee empowerment/ involvement | Description of products under development |
| Awards | Capacity to suggest and to implement changes | Product testing |
| Customer profile/market segment/ market share/number of customers | Teamwork | Awards |
| Pre sales support: information/ counsel/follow up | Performance assessment | Other – R&D |
| After sales service/insurance | Performance based compensation | Increase in sales/market shares |
| Customer satisfaction/complaints management | Earnings based compensation | Increase in investments |
| Customer loyalty | Career opportunities | |
| Awards | Award | |
| Internet service | Fringe benefits | |
| E-business sales | Employee satisfaction, survey | |
| E-business productivity (cost efficiency/speed) | Employee turnover | |
| Impact (award/ number of users or visitors) | Other | |

Table AI.
List of IC information items

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