Managing risk with intellectual capital statements

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Abstract

Purpose – The purpose of this paper is to present an empirical research study which took a novel examination of the relationship between risk and transparency with regards to a company's intellectual capital assets. The objective of this study is to evaluate how the systematic and idiosyncratic risk of publicly traded companies correlates with the degree of available information regarding their intellectual capital statements.

Design/methodology/approach – Intellectual capital is measured within the framework of a rating system that includes 44 parameters within eight focus areas. These data were collected from key informants at eight publicly traded IT companies in Sweden.

Findings – The results show a negative correlation between idiosyncratic risk and transparency and a positive correlation between market risk and transparency. However, the correlation between risk and transparency may partly be explained by organization size.

Research limitations/implications – This study was based on a small set of firms within one country so generalizability is limited.

Practical implications – The suggested methodology of intellectual capital measurement has since been used by over 400 organizations across four different continents.

Originality/value – This methodology consists of both qualitatively metrics as well as quantitative metrics that are then triangulated together to test various hypotheses.

Keywords Intellectual capital, Management information, Decision making, Assessment, Sweden

Paper type Research paper

Introduction

The focus on risk management has intensified with the increased fraudulent practices and ensuing collapse of global giants like Enron, Worldcom and Tyco. The market and regulatory bodies have responded with a number of aggressive corporate governance and audit controls which some say will help manage risk more effectively – but others believe is adding a tremendous overhead burden to financial reporting. Either way, this intensification has risk management practices booming in major accounting firms. However, can we systemically manage risk? Most large organizations measure financial and currency risk effectively, but are they doing a good enough job managing the risk inherent in their intangible assets?

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Generally speaking, intellectual capital measurement practices pale when compared to traditional financial statements (Roos *et al.*, 1997). Even though human capital is the critical asset of the knowledge era, most organizations are ill-equipped and not trained to measure and report on these assets (O'Donnell *et al.*, 2004, 2006). In most cases, senior executives have no clear understanding of how their intellectual capital directly impacts their own performance (O'Regan *et al.*, 2001, 2005). It is for this reason that we see a lack of strong evidence for intellectual capital disclosure (Bontis, 2003).

It is generally recognized that the market value of most knowledge-intensive companies is generally higher than the book value found on the balance sheet. The financial statements of an organization typically report the current accounting activity of a firm's operations and its cash flow (White *et al.*, 1997). This information is used when determining the market value of a firm within the framework of the expectations of future discounted cash flows. Still, the issue of how to determine those future cash flows remains. It is widely accepted that intangible assets are the major drivers of corporate value and growth in most economic sectors, but the measurement of these assets has eluded managers, accountants and financial analysts valuing investment projects so far. The traditional reporting system of Pacioli's double-book entry accounting has worked for more than 500 years, but it only provides the viewer with information about the company at a specific moment in time (Macve, 1996). To make an appropriate valuation of a company it is necessary to know where the company is going in the future. Information about the organizations ability to manage their intangible assets is a good parameter to estimate the future success of a firm (Lev, 2001). In this context, it is important to meet the external stakeholders' (i.e. investors, analysts, shareholders) demand of information which in addition to traditional financial statements should also include some insight on the firm's ability to manage its most important knowledge resources (Bontis and Fitz-enz, 2002).

The purpose of this study is twofold. First, we endeavour to investigate the accessibility of information regarding intellectual capital on eight publicly traded companies in the information technology sector. The investigation will be conducted within the framework of an intellectual capital rating system which includes 44 parameters within eight focus areas. Data will be triangulated from two sources: information provided by company reports and independent sources such as trade journals and stock exchange data. The second objective of this study is to evaluate how the systematic and idiosyncratic risk of publicly traded companies correlates with the degree of available information regarding their intellectual capital statements. Furthermore, we will test whether company size has any relationship with transparency.

Literature review

According to the efficient market hypothesis, the stock price of a publicly traded company reflects all available information related to that security (White *et al.*, 1997). The characteristics of the underlying business and its long-term prospects must be communicated to the investment community in a timely manner. Failure to do so effectively leads to the well-known challenges of CEOs who complain that their market valuation is understated; the volatility factor that applies to their company is too high, and the investment community's predictions of dire prospects makes fundraising more

difficult. The following literature review will focus on two areas: risk and intellectual capital.

Risk

The risk for any security is divided into two parts: systematic (or market) risk and non-systematic (or idiosyncratic) risk. Beta is a commonly used measure of the index of systematic risk. A firm's specific performance relates directly to its non-systematic risk. Finally, the variance of a security includes both the systematic and non-systematic risk which is also known as the total risk (Elton *et al.*, 2003):

$$\begin{aligned}\text{Total risk} &= \text{Systematic risk} + \text{Non-systematic risk} \\ &= \text{Market risk}(\beta) + \text{Idiosyncratic risk (firm-specific)}\end{aligned} \tag{1}$$

Investors generally alleviate the threat of non-systematic risk by diversifying it away. This happens when a well-selected portfolio from various investment types, industrial sectors and geographical locations is developed. In such a portfolio, the only relevant risk left is systematic risk which is measured by beta. Generally speaking, investors get rewarded for bearing systematic risk. It is not total variance of returns that affects expected returns, but only that part of the variance in returns that cannot be diversified away. Thus, stocks with higher betas are expected to provide a higher rate of return than lower beta stocks in the long run. However, this does not mean that they will offer higher rates of return over all intervals of time. In fact, if they always gave a higher return, than they would be considered less risky than lower beta stocks (Elton *et al.*, 2003).

According to Gujarati (2003), market and idiosyncratic risk can be explained with the following (see equation (2)):

$$R_i - r_f = \beta_i\left(R_m - r_f\right) + \varepsilon_i \tag{2}$$

where:

R_i = rate of return on stock i.

R_m = rate of return of the market.

r_f = risk-free rate of return (return on 90-day treasury bills).

β_l = beta coefficient of stock i.

ε_l = error.

Beta values are estimated by regressing the stock's return on the market's return. The most common estimation procedure is a simple ordinary least squares regression. If the market is uncertain about the value of a firm, then this uncertainty will be reflected in a higher volatility of the stock price.

The total variance, in turn, is an approximation for the total risk of the security. In other words, the total variance considers both the market and firm-specific risk. For example, changes in a company's stock price may be partly attributable to a set of macroeconomic variables, such as changes in interest rates, inflation, and national productivity, which are common factors because they affect the prices of most stocks in that market. These items are considered market risk components. In addition, changes

in stock price may be affected by the firm's success and performance, which include items like new product innovations, cost-cutting efforts, a disastrous fire at a manufacturing plant, or the discovery of an illegal corporate act. These components of return are considered firm-specific or idiosyncratic components because they affect only that firm and not the returns of other investments stocks in the market (Grinblatt and Titman, 2002).

In summary, the total risk of a security is defined by its total variance. This total risk can be divided up into market risk which is measured by beta and the firm's own idiosyncratic risk related to its performance.

Intellectual capital

The academic field of intellectual capital has grown significantly in recent years (Serenko and Bontis, 2004). Intellectual capital includes the value-creating factors of an organization that are not shown on the traditional balance sheet, but are of critical importance for the long-term profitability of a company (Arbetsgruppen, 1989; Andreou and Bontis, 2007). Considered an intangible asset, intellectual capital consists mainly of three parts: human capital, structural capital and relational capital (Bontis, 1996). Human capital represents the combined knowledge, skill, innovativeness and capabilities of the company's individual employees. Structural capital represents the non-human storehouses of knowledge embedded in technology, software, databases, structure and routines and relational capital represents the knowledge embedded in business relationships with clients and suppliers (Edvinsson and Malone, 1997; Bontis, 1998).

Intellectual capital is troublesome because of the cost that is incurred in developing it (Bontis, 1999). Furthermore, it is extremely difficult to measure and the potential explicit benefits are nearly impossible to determine (Bontis *et al.*, 1999). Even the knowledge assets embedded in new discoveries such as drugs, engineering designs or software innovations are by and large not traded in organized markets. Plus, the property rights over these assets are not fully secured by the company, except for legally-protected intellectual property (e.g. patents and trademarks) (Lev, 2001). Notwithstanding, the risk associated with the development, management and commercialization of these knowledge assets is generally higher than that of physical assets (Lev, 2001).

According to Bontis (1999, 2001), intellectual capital measurement is an extension of the human resource cost accounting literature popularized in the 1960s. Morse (1973) highlights the distinction between human resource measurement that has both an internal and external focus:

> Human resource accounting has two components: human asset accounting and human capital accounting. Human asset accounting is concerned with determining the value of the human resources employed in an organization to the organization. Human capital accounting is concerned with the determining the value of the human resources employed in an organization to the employees of that organization (Morse, 1973, p. 593).

According to Morse (1973), most accountants are interested in human asset accounting with its emphasis on organizational reporting. The intellectual capital research has extended this line of thinking to embody both an external and internal focus (Sveiby, 1997). Much of the initial intellectual capital reporting that most firms engage in is for internal purposes with the ultimate goal of publishing an external document for

stakeholders (Bontis, 2003). According to Sveiby (2001) the suggested measuring approaches for intangible assets fall into at least four categories (see Figure 1):

(1) *Direct intellectual capital method.* Estimate the dollar value of intangible assets by identifying its various components. Once these components are identified, they can be directly evaluated, either individually or as an aggregated coefficient.

(2) *Market capitalization method.* Calculate the difference between a company's market capitalization and its stockholders' equity as the value of its intellectual capital or intangible assets.

(3) *Return on assets method.* Take the average pre-tax earnings of a company for a period of time and divide it by the average tangible assets of the company. The resulting ROA percentage is then compared with its industry average. The difference is multiplied by the company's average tangible assets to calculate an average annual earnings from intangibles. Dividing the above average earnings by the company's average cost of capital provides an estimate of the value of its intangible assets.

(4) *Scorecard method.* The various components of intangible assets or intellectual capital are identified and proxy indicators are generated and reported in scorecards or as graphs. Scorecard methods are similar to direct intellectual capital methods, except that no estimate is made of the dollar value of the intangible assets. A composite index may or may not be produced.

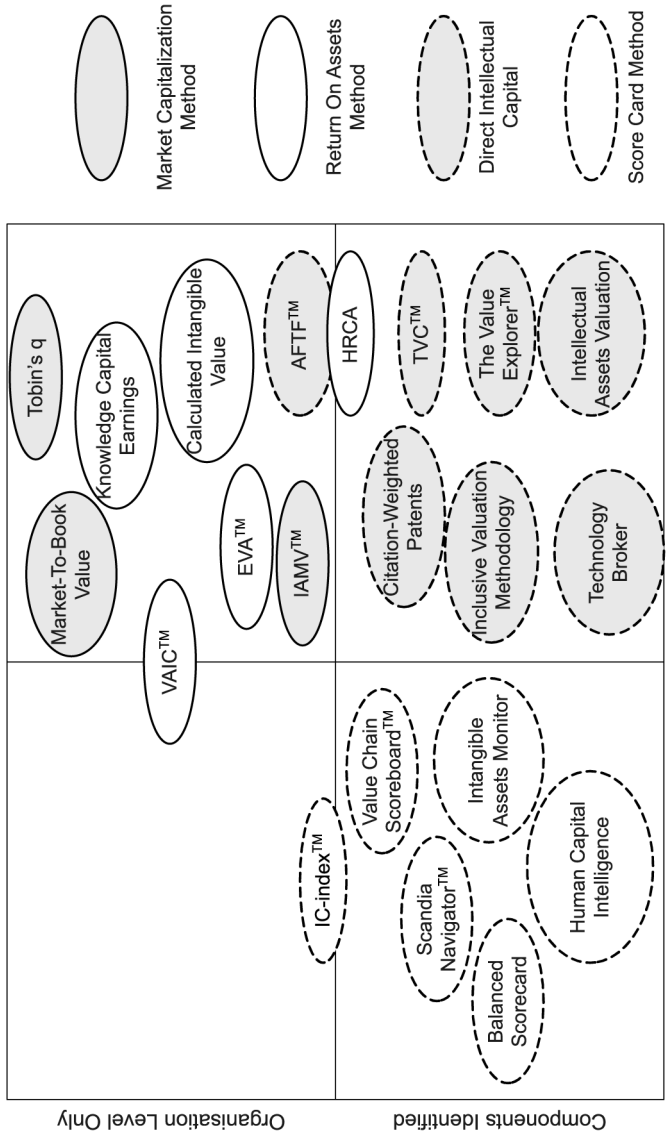
Conceptual framework

The IC Rating™ system was developed by Intellectual Capital Sweden AB (see www.intellectualcapital.se for further information). Intellectual Capital Sweden AB is a small management consulting firm based in Sweden whose main focus has been to develop measurement tools within non-financial frameworks. Its most widespread tool, IC Rating, has been used in over 400 major rating projects in organizations located on four continents.

For the purposes of this project, a further extension of the model was carried out by Haar and Sundelin (2001) so that the system could be applied both internally and externally to the firm. For a comprehensive review of the system, please see Jacobsen *et al.* (2005). The system enables organizations to provide assessment and benchmarking for a variety of intellectual capital-based metrics. The conceptual framework underlying the system is described as follows (see Figure 2).

As can be seen in Figure 2, the model resembles Skandia's Navigator (Edvinsson and Malone, 1997) but with some slight alterations. First and foremost, the system does not in any way deal with aspects of financial capital which was one of the important elements of the Navigator. The idea of making structural capital internally-focused and relational capital externally-focused originates from Sveiby's (1997) Intangible Asset Monitor. Business recipe has since been added to the original model and the overall descriptions are as follows:

- Business recipe consists of the company's business idea and strategy in combination with the conditions in the chosen business environment.
- Structural capital consists of the support systems which form the organizational backbone of the enterprise.



Source: Sveiby (2001)

Figure 1.
Intangible assets measurement models

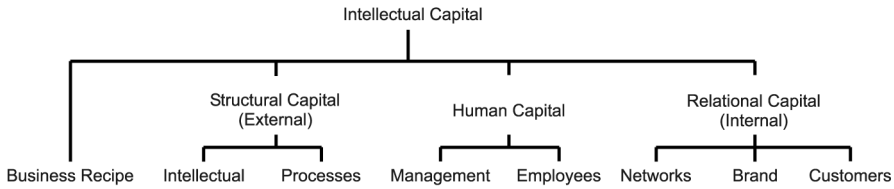
- Human capital includes the competencies, knowledge and skills of management and personnel.
- Relational capital consists of the knowledge embedded in valuable relationships with customers, suppliers and members of other networks.

The IC Rating process requires data to be collected from internal as well as external interest groups related to the company. This involves structured interviews with management, employees, customers and suppliers. Generally, it takes approximately six to eight weeks to collect the necessary data. Each component receives three grades. First, there is an assessment of the efficiency of the current value. Second, there is an assessment of the company's efforts to renew and develop their intellectual capital. Finally, there is an assessment of the risk of a potential decrease in the current value.

The efficiency and renewal/development of each metric ranges from AAA to D, where AAA signifies an extremely high grade of quality and D signifies a complete lack of quality. The risk component is measured on a scale of four levels ranging from negligible risk (–) to a very high degree of risk (RRR) (see Table I for a review).

Rating methodology

The IC Rating process closely mirrors the metric scales used by Standard & Poor's, Moody's Investor Services, and other well-known rating services. Similarities in scaling with other systems have allowed the IC Rating process to gain widespread appreciation and application for stock market valuation, annual reports, as well as credit analysis related to intellectual capital reporting (Jacobsen *et al.*, 2005).



Source: Jacobsen *et al.* (2005)

Figure 2.
IC Rating™ system conceptual framework

Efficiency	Renewal/development	Risk
AAA	AAA	
AA	AA	
A	A	R
BBB	BBB	RR
BB	BB	
B	B	RRR
CCC	CCC	
CC	CC	
C	C	
D	D	

Table I.
IC rating scales

The methodology used to perform the rating is deeply rooted in the theoretical paradigms of intellectual capital measurement and has been refined by Intellectual Capital Sweden AB for several years. After all the interviews with key informants are completed, each parameter is assigned a score based on the rating scales (Jacobsen *et al.*, 2005). The mean average of these parameter scores is calculated in order to arrive at a focus area score. Finally, the company IC rating consists of the mean score of each of the eight focus areas. The one to five scale is converted to a score out of 100 as follows: 1 = 0, 2 = 25, 3 = 50, 4 = 75 and 5 = 100.

In addition to the actual calculation of each parameter, each measure is also subjected to an evaluation of its accessibility on a scale from 1 to 5 as follows:

(1) Information about the parameter is not available at all or deemed insufficient.

(2) Information is meagre and not detailed.

(3) The amount of information is satisfactory for an assessment to take place.

(4) The amount of information is more than satisfactory but not complete.

(5) Information is comprehensive, broad, verified in a number of sources and the appraiser is able to get an all-encompassing picture of the parameter.

The accessibility scales are used to evaluate the transparency of intellectual capital reporting. We hypothesize a potential relationship between transparency and company size. There might also be a relationship between a company with high business risk and low transparency, since it is likely that a risky venture would try to shield pertinent information from the market.

There were a total of eight companies used for this study seven of which were also examined by Haar and Sundelin (2001). All of the organizations operate within the information technology industry in Sweden and are considered knowledge-intensive. Although this group is not perfectly homogenous, we feel that the sample is representative of organizations who serve similar markets with similar services and products thus accounting for any industry effects. The sample of organizations with descriptive information is as follows (see Table II).

Analysis

The first set of results depicts the accessibility rating for each organization (see Figure 3).

Company	Turnover (000s SEK)	Employees	Trading volume
Framfab	655,250	692	817,597,977
Knowit	256,200	311	3,511,108
MSC	74,197	68	1,229,247
Prevas	234,051	288	2,261,339
RKS	334,797	365	763,625
Softronic	328,686	353	7,496,702
Tieto Enator	10,500,683	9,950	27,520,566
WM-Data	11,975,000	8,315	365,531,552

Source: Fiscal Year (2002)

Table II.
Values as reported by the Stockholm Stock Exchange

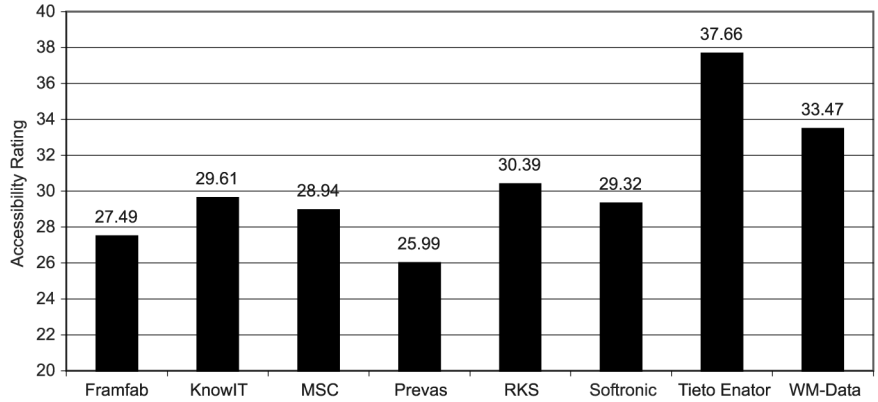


Figure 3.
Accessibility rating

Tieto Enator received the highest accessibility rating (37.66) followed by WM-data (33.47). These are the largest companies in terms of both turnover (over 10,000 million SEK) and number of employees (greater than 8,000). Table III outlines the aggregated parameter scores for each of the eight focus areas by organization as well as the overall IC Rating score. Once again, Tieto Enator and WM-Data had the highest IC Rating scores of 37.66 and 33.47 respectively.

Once again we see that the organizations with the highest betas are the same ones with the highest IC Rating scores. To test the relationship between the two variables we regressed the beta score against the IC rating ($R^2 = 56.5\%$, p-value $= 0.032$). Clearly we can see that the relationship is positive, significant and substantive. A scatter plot outlines the results in a visual manner (see Figure 4). After removing the outlier Prevas, the R^2 increases to 69 per cent.

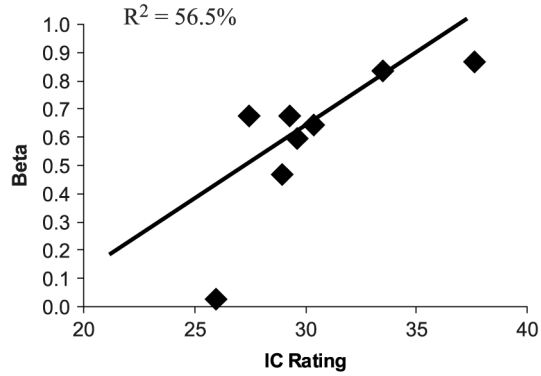
To test the relationship between idiosyncratic risk and intellectual capital, we examine the relationship between variance and the IC rating. We notice that the scatter plot (see Figure 5) illustrates a negative albeit slightly significant relationship ($R^2 = 47.9\%$, p-value $= 0.057$).

To test whether there is a connection between transparency and size, we examine the relationship between turnover and the IC rating. WM-Data and TietoEnator are without a doubt, by far the largest of the analyzed companies both in number of

	FA1	FA2	FA3	FA4	FA5	FA6	FA7	FA8	IC Rating	Beta	Variance
Framfab	27.50	5.00	17.86	62.50	30.00	18.75	0.00	58.33	27.49	0.68	0.085
KnowIT	42.50	0.00	21.43	43.75	37.50	25.00	0.00	66.67	29.61	0.60	0.039
MSC	25.00	5.00	28.57	43.75	37.50	25.00	0.00	66.67	28.94	0.47	0.040
Prevas	42.50	15.00	25.00	31.25	27.50	0.00	0.00	66.67	25.99	0.03	0.052
RKS	45.00	25.00	28.57	31.25	42.50	37.50	0.00	33.33	30.39	0.64	0.065
Softronic	30.00	20.00	17.86	43.75	50.00	6.25	0.00	66.67	29.32	0.68	0.046
TietoEnator	37.50	5.00	32.14	43.75	35.00	56.25	50.00	41.67	37.66	0.87	0.016
WM-Data	37.50	0.00	53.57	45.00	52.50	37.50	0.00	41.67	33.47	0.83	0.040

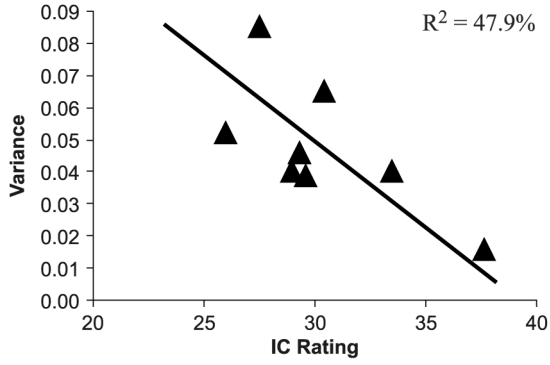
Table III.
Focus area scores and IC rating

Notes: FA1 = Business recipe; FA2 = Intellectual property; FA3 = Process; FA4 = Management; FA5 = Employees; FA6 = Network; FA7 = Brand; FA8 = Customers



R	R Square	Std. Error	Significance
0.751	0.565	0.188	0.032

Figure 4.
Beta and IC rating



R	R Square	Std. Error	Significance
-0.692	0.479	0.016	0.057

Figure 5.
Variance and IC rating

employees and annual turnover. An issue that is in favour of large organizations is that there most likely will be adequate resources allocated to making hidden assets more visible. On the other hand though, smaller organizations might have a better opportunity to recognize intangible value because of the intimacy of fellow employees. Results between turnover and the IC rating for the whole sample show a positive correlation ($r = 0.85$, p-value < 0.01). However, after removing the two largest firms (TietoEnator and WM-data), the correlation drops substantively ($r = 0.17$) and is no longer significant.

Adjusted weightings of focus areas

Haar and Sundelin (2001) support the notion that each area of focus be equally weighted (i.e. 1/8 value). However, what happens if one particular area (e.g. brand) is more important than the others? Would different weights assigned to different focus

areas better reflect the strengths and weaknesses of a company? For example, some firms in the retail sector rely heavily on the influence of their brand. In the software sector, a major source of growth might be through licensing of intellectual property. Furthermore, knowledge intensive law firms and consulting organizations rely heavily on human capital development.

We contacted key informants in each of the participating organizations and asked them what they believed was the optimal weighting of importance for each of the focus areas. As expected, the results were not evenly distributed (see Table IV for the weightings and adjusted IC Rating values).

The correlation between market risk and the adjusted IC Rating was positive ($r = 0.666$) while the correlation between idiosyncratic risk and the adjusted IC Rating was negative ($r = -0.494$). The differences between results comparing the original IC Rating with the adjusted one are as follows (see Table V).

Generally speaking, the correlation between intellectual capital and market risk is positive, and the correlation between intellectual capital and variance is negative. Furthermore, the correlation between intellectual capital and turnover (size) is also substantively positive. Even when an adjusted weighting to intellectual capital focus areas is assigned, the same relationships remain.

Conclusions

The purpose of this study was to examine the ratings of eight Swedish IT companies as it pertains to intellectual capital and link them to measures of risk. External stakeholders (e.g. investors, suppliers, and customers) would benefit from increased

	FA1	FA2	FA3	FA4	FA5	FA6	FA7	FA8	Adjusted IC rating
Framfab	27.50	5.00	17.86	62.50	30.00	18.75	0.00	58.33	36.00
KnowIT	42.50	0.00	21.43	43.75	37.50	25.00	0.00	66.67	37.51
MSC	25.00	5.00	28.57	43.75	37.50	25.00	0.00	66.67	36.95
Prevas	42.50	15.00	25.00	31.25	27.50	0.00	0.00	66.67	31.75
RKS	45.00	25.00	28.57	31.25	42.50	37.50	0.00	33.33	33.74
Softronic	30.00	20.00	17.86	43.75	50.00	6.25	0.00	66.67	37.44
TietoEnator	37.50	5.00	32.14	43.75	35.00	56.25	50.00	41.67	39.16
WM-Data	37.50	0.00	53.57	45.00	52.50	37.50	0.00	41.67	41.49

Table IV.
Adjusted weightings of focus areas

Notes: FA1 = Business recipe –13.50 per cent; FA2 = Intellectual property – 7.65 per cent; FA3 = Process – 16.65 per cent; FA4 = Management – 20.00 per cent; FA5 = Employees – 15.00 per cent; FA6 = Network – 4.73 per cent; FA7 = Brand – 5.00 per cent; FA8 = Customers – 17.82 per cent

Dependent variable	Independent variable	R	R^2	Significance
Market risk	IC Rating	0.751	0.492	0.03
Market risk	Adjusted IC rating	0.666	0.444	0.07
Idiosyncratic risk	IC rating	−0.692	0.479	0.06
Idiosyncratic risk	Adjusted IC rating	−0.494	0.244	0.22
Turnover	IC rating	0.848	0.720	0.01
Turnover	Adjusted IC rating	0.718	0.516	0.05

Table V.
IC rating versus adjusted IC rating results

disclosure of intellectual capital assets (Mouritsen *et al.*, 2003). This type of reporting would complement the traditional balance sheet by providing external stakeholders with further information that may provide a peak into the potential future viability of such firms.

Goyal and Santa-Clara (2001) argue that idiosyncratic risk explains most of the variation of average stock price fluctuations over time. In fact, over time it is idiosyncratic risk that drives the forecastability of the stock market. In this study, we have shown a negative correlation between idiosyncratic risk and transparency and a positive correlation between market risk and transparency. These findings suggest that an investor holding a well diversified portfolio generally does not take intellectual capital statements into consideration when making investment decisions. Furthermore, we validate previous results showing that there is a negative correlation between intellectual capital and idiosyncratic risk.

During the work of this particular research project, we uncovered three potential future avenues that should also be pursued as follows:

(1) The generalizability of our study would benefit greatly if all of the companies listed on the Stockholm stock exchange were included. If the IC Rating were to be institutionalized and published it would provide further incentive for companies to communicate and disclose their intellectual capital information. If the ratings were to be published repeatedly, a standard set of metrics could be obtained. This information would meet market demands and make the information more easily available for further study. These ratings could also be benchmarked over time by sector giving companies a more better understanding of their relative performance.

(2) A larger sample size would also allow us to confirm our suspicion that beta has a positive correlation with variance and a negative correlation with transparency. The research could also be carried out in other European countries as well as Asia and North America. This would provide the basis for a global dataset on intellectual capital metrics that is universally generalizable.

(3) Since this study was based on cross-sectional data, the results can only be inferred for a single year. Similar studies over time would allows us to confirm the longitudinality of such relationships.

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