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Corporate Governance Mechanisms, Financial Risk, Industry Sector and Human Capital Investment as Determinants of Voluntary Disclosure of Intellectual Capital in UK Listed Firms

Walter P. Mkumbuzi[1]

[1] Department of Accountancy, University of Zimbabwe, Zimbabwe

Correspondence: Walter P. Mkumbuzi, Department of Accountancy, University of Zimbabwe, Zimbabwe. E-mail: wmkumbuzi@commerce.uz.ac.zw

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Abstract

This research examines investment in human capital, financial risk, industry sector and corporate governance mechanisms as determinants of the voluntary disclosure of intellectual capital in a sample of 443 UK listed company annual reports for the year 2003/2004. This year precedes 2005 and the adoption of International Accounting Standards by European Union Member States thus providing the context for the study under reduced mandatory regulation. Voluntary disclosure is measured by an index based on intellectual capital attributes disclosed in the narratives and illustrations of the annual reports. The benefits of signalling intellectual capital are expected to outweigh proprietary costs due to these disclosures. These costs may be more prevalent in innovative and technological companies. Corporate governance mechanisms enhance voluntary disclosure and reduce information symmetry more specifically in those companies found to have higher levels of intangible assets in their resource base. The results suggest that companies associated with reduced financial risk and accompanied by growth are characterised with higher levels of voluntary disclosure of intellectual capital. Voluntary disclosure of intellectual capital is enhanced when large companies operating in high-tech and innovative industries are characterised by investments in human capital. The results suggest that companies that are able to maintain adequate governance systems through segregation of executive and non-executive duties and to a less extent through the presence of experienced non-executive directors exhibit higher levels of voluntary disclosure.

Keywords: voluntary disclosure; intellectual capital, financial risk, industry, corporate governance

1. Introduction

1.1 Importance of Intellectual Capital Disclosure

The influence of Intellectual Capital (IC) on financing and investing decisions continues to grow due to its increasing value within the equity of firms. Financial and investment decisions made by stakeholders require an assessment of the value of organisational IC. Lack of IC information renders decisions complex as the market's identification, analysis, valuation and therefore differentiation of superior and inferior market participants becomes more risky. Companies need to be proactive in making this information available. The UK equity market is relatively efficient and the expectation is that firms are able to make choices on the level of disclosure and the nature of signals and that such reporting is captured by the market. Being an advanced manufacturing and service nation, firms are likely to hold both tangible and intangible assets (IA); as such industries may be well defined. Shareholders of these firms are likely to apply corporate governance mechanisms given the dispersal of share ownership in UK listed firms. The extent of information asymmetry is likely to be higher in UK listed firms as managers may have more control relative to shareholders and with respect to other European equity markets. In particular, with respect to IA and IC reporting in which the lack of measurability, results in no disclosure of IC.

The intangible nature of IC requires the existence of adequate structures for identifying, measuring, managing and reporting IC. As the equity market is not perfect, management can enrich themselves at the expense of shareholders without being displaced (Berle & Means, 1934; Lubatkin, Lane, Collin, & Very, 2007). Management would be expected to conceal negative information about the company in attempting to avoid

dismissal or a reduction in incentive contracts. Concealing negative information may provide certain advantages for management including maintaining shareholder confidence in the company's management and providing senior management time to turn-around failing projects. The constant pressure to increase shareholder value and the fear of being replaced may motivate management to disclose favourable information likely to generate positive impressions about their managerial performance (Cheney & Carroll, 1997; Shapiro, 2005). Corporate governance mechanisms may assist in ensuring transparency and accountability through the provision of complete and credible IC disclosure. In addition, the nature of the management culture, their risk attitudes towards IC investment, the resources available, and the nature of the business, the industry sector and the existence of monitoring and controlling mechanisms is likely to impact the reporting process. As such, narratives and qualitative reporting has been applied in disclosing IC in addition to explaining in part the difference between book value (BV) and market value (MV). However, cases of reporting mal-practices have led to an increase in monitoring and control mechanisms through the introduction of various corporate governance codes, introduced to curb these high profile corporate scandals; however, the voluntary nature of these codes only adds credence to sceptics' arguments that they may be a mere charade and as such hold no substance. Furthermore, markets are becoming increasingly aware that due compliance with accounting standards in a manner endorsed by audit firms does not generally provide adequate information on the wealth of the company, its growth or financial opportunities. Companies therefore supplement these mandatory regulations with voluntary disclosure to ensure information asymmetry is reduced between internal and external stakeholders and that the financial risk to the equity is minimised.

1.2 Analytical Framework

Signalling theory has developed into a mechanism for explaining the disclosure of good news (Spence, 1973). The lack of adequate IC disclosures leads to information asymmetry and to the problem of adverse selection (Akerlof, 1970) however, sufficient signalling of IC information may illustrate the underlying reality and may influence stakeholders by reducing asymmetry of information in firms with higher levels of IC. Signalling mechanisms improve the allocation of resources ensuring that companies that are more efficient receive more capital (Inchausti, 1997) as signalling reveals the company's competitive advantage within the market. Management of such companies signal their superior capabilities in order to differentiate themselves from companies without such an advantage. The presence of both intangible and tangible resources enables the analytical framework to combine the resource based view of the firm (RBV) with signalling theory and proprietary cost hypothesis in raising an expectation with respect to management behaviour. Intellectual capital intensive companies with adequate barriers to entry may prefer such a regulatory environment; this may enable the signalling of the correct valuation of equity thus allowing companies to distance themselves from their competitors. Proprietary costs arise when information is revealed that potentially damages the company if it results in increased competition and or government intervention (Gray, Meek, & Roberts, 1995). The harmful effect of these competitive costs has also a major impact on the equity market as it reduces the voluntary disclosure of intellectual capital (VDIC) i.e. disclosing sensitive data to existing and potential investors and creditors. These factors, proprietary costs and competitive costs, may restrict full disclosure of IC as disclosure may lead to a potential unfavourable change in future earnings (Dye, 1985). Nevertheless, the identification and measurement of these proprietary costs is complex, being forecasts of actual costs and intangible in nature, it is necessary for management to have appropriate management procedures in place to assist in the coalition of accurate information for these estimates. Proprietary cost theory states that the incentive to disclose information is a decreasing function of the potential proprietary costs attached to a disclosure and an increasing function of the favourableness of the news in a disclosure (Verrecchia, 1983). As such, the better the prospects of the company in the IC disclosure and the greater the barriers to entry the more likely management are to disclose IC attributes.

1.3 Determinants of Intellectual Capital Disclosure and Hypotheses Development

Turnover (SALES) is selected as a proxy for size. It recognises that both tangible and intangible assets contribute to the generation of revenue and therefore SALES is independent of the intensity of IC in firms. The selection of the market value to total assets ratio (MVTA) examines the influence of capital intensity alone on the voluntary disclosure of intellectual capital (VDIC). Capital intensity as measured by MVTA does not account for the IC of equities and as such may be negatively associated with VDIC whilst concurrently, total assets (TA) is the tangible capital applied in the equity of the company to generate operations and may not measure the entire capital applied in IC intensive companies. Total assets have been found to be positively associated with disclosure, consistent with the work of Cooke (1989) and McNally, Eng and Hasseldine (1982); SALES with disclosure (Firth, 1979) and market value (MV) with disclosure (Hossain, Tan & Adams, 1994 and Lang &

Lundholm, 1993). Signalling theory explains the competitive resources available to larger companies in providing VDIC; benefits of signalling IC are expected to outweigh the potential proprietary costs arising from competitive and political costs. Consistent with Edvinsson and Malone (1997) who define the difference between a company's TA and MV as the value of IC this article acknowledges the existence of this "hidden value" due to the inability of historical financial statements to report intellectual capital attributes comprising structural capital (SC), relational capital (RC) and human capital (HC). Intellectual capital intensive companies are likely to have a larger MVTA ratio and VDIC is likely to be higher. Few studies have conducted an empirical investigation on MVTA and disclosure. Patton and Zelenka (1997) found no significant relationship between mandatory disclosure and percentage of intangible assets (IA). The explanations were based on signalling theory however, little IA had been regulated as such the lack of a link between accounting figures and IA may have restricted this study. The existing literature suggests that IC represents the missing value in the balance sheet that may be attributed to IC, IA and intellectual property (IP). Tobin's Q has also been studied with respect to establishing a relationship with the "hidden value"; this article applies MVTA ratio as its proxy for this "hidden value". The motivations for an expectation of a positive association are derived from Garcia-Meca and Martinez (2005) that confirm MVTA as a positive significant variable in the voluntary disclosure of presentations to analysts.

H1a: Turnover is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

H1b: The ratio of market value to total assets is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

High investment in HC consisting of employee remuneration and benefits may result in management signalling HC attributes. The explanation for the change in VDIC due to the variation in employee cost (EMPC) may be explained by signalling theory. This article expects that higher EMPC as measured by staff costs including all employee benefits such as health insurance and pension plan contributions divided by the number of employees representing both full and part time employees of the company may lead to more VDIC. Despite the benefits to be gained from disclosure of these investments, pressure from competitors, may curb full disclosure due to employee mobility. Furthermore, political costs may restrict such voluntary disclosures due to the risk of pressure from labour unions and other regulatory bodies.

H2: Investment in employee cost is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

An increase in the gearing ratio (GEAR) increases the probability of financial and insolvency risk. Firstly, to counteract this increase in financial risk, management may provide VDIC in a bid to reduce information asymmetry and illustrate transparency and accountability; and secondly, highly geared companies may not have the financial resources required for firstly, investment in IC and secondly investment in the processes and procedures required to identify, manage and report IC. Agency theory views debt as a governance device useful in reducing the conflict between shareholders and management (Jensen, 1986). Debt reduces cash flow available to management as the company is contractually bound to repay interest and capital. Furthermore, companies investing in tangible assets are more likely to have assets that are more likely to be acceptable as debt security as such debt may be associated with more tangible asset based companies. Williamson (1988) concluded that debt providers might be unwilling to finance projects with high company asset specificity; such companies may exist in industries that may be associated with resources that have reduced tradability. The R&D of a company has been shown to be negatively associated to its GEARING (Balakrishnan & Fox, 1993 and Baysinger & Hoskisson, 1989). With increasing insolvency risk, management may be expected to focus on short-term projects to the exclusion of discretionary expenses such as R&D.

H3: Gearing is a negative and significant variable in the variation of the voluntary disclosure of intellectual capital.

Technological intense companies may invest more IC in their operations and may disclose such IC in their annual reports. These firms may be listed on a technological index. The first industry classification is therefore represented by the LSE TMRK which is the LSE international market for innovative technology companies and includes , biotechnology, specialist pharmaceuticals, drug delivery, medical technology, computer hardware, computer servicing, internet, semi-conductors, software and telecom equipment. Listing on this exchange may be justified as the firm promotes its R&D and technological development.

H4: TechMARK listing is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

The second industry classification is that of the UK SIC of Economic Activities (National Statistics, 2003) that provides an ascending industry classification ranging from 0100 basic agriculture industry to 9000 complex service industry. Forestry and paper, food producers and processors, beverages and tobacco form the most basic industries whereas telecommunications, media and entertainment, health, leisure and hotels form the more complex service industries. Service industries are expected to apply more IA than tangible assets in operations. Agriculture, forestry and tobacco are highly mechanised industries, employing a substantial amount of tangible assets relative to intangible assets. Following Bozzolan et al. (2003), the expectation is of a positive significant association; the motivations are derived from RBV and signalling theory. Service and highly complex companies are expected to apply IC, unique to their organisation and therefore not easily replicable.

H5: Standard Industry Classification is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

Non-executive directors (NONEXEC) provide a dual role of providing resource links for the firm as well as providing a monitoring role on management behaviour. This role may result in more transparency and accountability. Both Leftwich et al. (1981) and Fama and Jensen (1983) argued that the larger the proportion of NONEXEC on the board the more effective it will be in monitoring managerial opportunism and diffusing agency conflicts between managers and owners in addition to providing the necessary checks and balances needed to enhance board effectiveness. As such, if the number of NONEXEC accounts for a small proportion of the board membership, they may lack sufficient monitoring power (Ho & Wong, 2001). However, a large proportion of NONEXEC does not necessarily improve decision-making or performance (Haniffa & Cooke, 2005). This article introduces experienced non-executive directors (EXPRCD), representing NONEXEC that hold more than one directorship in different listed companies. Although, Haniffa and Cooke (2005) argue for more NONEXEC on boards, due to their wider expertise, prestige and contacts, their results suggested a negative association indicating perhaps that NONEXEC lack the experience and knowledge. Those directors that bring expertise on board may influence effective board monitoring and company performance (Useem, 1993). The motivation for the variation in VDIC that may be associated with the variation in additional insight links to the external environment, expertise, prestige and contacts attributable to EXPRCD that maybe associated with agency theory. Multiple or cross-directorships are expected to promote VDIC.

H6: The proportion of experienced non-executive directors is a positive and significant variable in the variation of the voluntary disclosure of intellectual capital.

According to agency theory, dual roles can significantly impair the board's most important functions of monitoring, disciplining and compensating senior managers (Barako, Hancock & Izan, 2006); furthermore, the engagement of opportunistic behaviour may remain unchecked due to the lack of segregation of duties. Agency costs are likely to result in reduced IC disclosure whereas signalling theory is likely to reduce information asymmetry. Agency theory may provide an expectation that board dominance may result in agency costs. Management are therefore more likely to suppress negative information and disclose positive information. Forker (1992) found evidence suggesting a negative association between disclosure quality and corporate governance as measured by "dominant personality" consistent with the findings of Fama and Jensen (1983, p.314) that combined roles signal the absence of separation of decision management and decision control. The optimum balance would be to remove the risk to the company of the chair who is a non-executive director (CNED) being accountable for two functions, non-executive director and chair. Forker (1992) asserts that a dominant personality in a dual role poses a threat to monitoring quality and is detrimental to the quality of disclosure. A negative association is expected between VDIC and CNED consistent with agency theory, as the combined role of CNED is likely to require increased monitoring and consistent with stewardship theory and the existence of a dominant personality.

H7: A chair who is a non-executive director is a negative and significant variable in the variation of the voluntary disclosure of intellectual capital.

The next section discusses the sample selection and defines the data, models and methods that are applied in testing the hypotheses.

2. Data and Methodology

2.1 Data, Models and Methods

Data for the empirical tests was obtained from the annual reports of firms selected from the FTSE All Share Index for the year 2003/2004 and financial information from *DataStream.* This year precedes 2005 and the adoption of International Accounting Standards by European Union Member States thus providing the context

for voluntary disclosure study under reduced mandatory regulation. The sample of companies from the Financial Times excluded firms in the banks, financial, insurance, life assurance, mining, oil and gas, real estate, speciality and other finance, investment and property industries. A disclosure index was generated by applying a content analysis on annual reports. The method applied was consist with the methods applied by Guthrie, Petty, Ferrier and Well (1999), Bozzolan et al. (2003), Milne and Adler (1999), Davison and Skerratt (2007), Beattie, McInnes and Fearnley (2004, p. 32) and Unerman (2000) and involves codifying IC attributes into SC, RC and HC in order to derive patterns in disclosure (Guthrie & Petty, 2000, p. 244). This article proposes its operational definition of a voluntary disclosure IC attribute as any IC information, financial or non-financial, illustrations, diagrams and graphical presentation contained in the annual reports that is not required to be disclosed by the Companies Act 1989, EC Directives (Fourth and Seventh), Statements of Standard Accounting Practice, Financial Reporting Standards (FRS) (7, 10 and 11) and the disclosure rules issued by the LSE.

Other visual forms of communication have been found to provide an immediate and effective means of corporate disclosure (Beattie & Jones, 2001 and Beattie & Thompson, 2006). Consistent with the evidence provided by Davison and Skerratt (2007) within the top 100 UK companies, 94% of pictures communicated intangible aspects of companies businesses. As illustrated in Table 2.1 the 23 IC attributes have been identified as representative of the spread of IC attributes that may bring comparability to existing IC studies (Guthrie et al., 2004; Bozzolan et al., 2003). Toms (2002) proposes that the volume of disclosures may be potentially misleading when it is the credibility or quality of disclosure that is important. Furthermore, Hasseldine et al. (2005) proposes that to capture the underlying relationship, it may be necessary to apply a quality adjusted content analysis method in which disclosures are counted and weighted to identify their likely significance consistent with the findings of Beattie & Thompson (2006, p. 11). This approach minimises coding errors that may be associated with as Toms (2002) describes, rhetoric and non-verifiable disclosures that are largely without commitment as opposed to the more informative and higher quality disclosures.

If the attribute was not disclosed the firm earned a score of "0". A disclosure of an attribute earned a score of "1" under the disclosure index (DI). A competitive advantage was illustrated by a competitive advantage disclosure and earned a score of "2" under the weighted disclosure index (WDI); this article refers to WDI as disclosure of the IC competitive advantage (ICCA) attribute that is defined as (ICCA), the competitive advantage of signalling a unique product, service, process, IP, relationship or human resource when the competitive advantage cannot be replicated due to barriers to entry and the company can sustain above normal returns that place it ahead of competitors. The competitive advantage scheme applied in this article, accounts for the proactive identification, development, management and utilisation of IA in organisations. It is essential that firms signal their IC if markets are to acknowledge the existence of intangible assets. Such signals communicated through the narratives and illustrations of the annual report bear little proprietary costs or may be protected in industries with high entry-barriers.

Table 1. Intellectual capital framework

Internal Structural Capital (SC)	External Relational Capital (RC)	Human Capital (HC)
Patents	Brands	Know-how
Copyrights	Customers	Education
Trademarks	Customer loyalty	Vocational qualifications
Management philosophy	Distribution channels	Work-related knowledge
Corporate culture	Business collaborations	Work-related competencies
Management processes	Licensing agreements	Entrepreneurial spirit,
Information systems	Favourable contracts	Innovativeness, proactive and reactive abilities, changeability
Networking systems	Franchising agreements	
Financial relations		

Source: Stewart (1997)

2.2 Research Design

Consistent with the research design of disclosure determinants, (Ho & Wong, 2001; Haniffa & Cooke, 2005; Bozzolan et al., 2003; Cooke, 1989 and McNally, Eng & Hasseldine, 1982) the article develops Model I and Model II in which the determinants of VDIC are classified into HC investment, financial risk/gearing, industry sector and corporate governance mechanisms. Each model is empirically tested using both DI and WDI and using the OLS regression model and the QREG model. In addition Model II applies the SIC industry classification based on industry groupings dummy variables (Appendix 1). The empirical forms of the models and a summary of the defined variables are set out below:

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR - \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIC + \beta_7 TMRK + \beta_8 SIZE + \varepsilon \quad (1)$$

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR - \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIZE + \beta_7 BASIC + \beta_8 ENG + \beta_9 ELEC + \beta_{10} PHAR + \beta_{11} RET + \beta_{12} COMP + \beta_{13} SERV + \varepsilon \quad (2)$$

Where β_0: intercept; $\beta_1 \_ \beta_8$: coefficient of slope parameters; ε: error term.

Dependent Variables:

SRWDI: Weighted disclosure index (WDI) based on disclosed ICCA attributes measured as a square root transformation;

SRDI: disclosure index based on disclosed IC attributes measured as a square root transformation;

Independent Variables:

LNSALES: Size being the sum of net sales or revenues representing gross sales and other operating revenue less discounts, returns and allowances as a log-transformed variable;

MVTA: ratio of market value to total assets

TMRK: dichotomous variable that scores "1" for listing on the TechMARK listing and "0" otherwise;

SRSIC: standard industry classification measured as a square root transformation;

EMPC: staff costs including all employee benefits such as health insurance and pension plan contributions / number of employees (representing the number of both full and part time employees of the company);

GEAR: total debt / total capital % (long-term debt + short-term debt & current portion of long-term debt) / (total capital + short term debt & current portion of long term debt) * 100;

EXPRCD: ratio of experienced non-executive directors to total directors measured as a square root transformation;

CED: dichotomous variable that scores "1" for a chair who is a non-executive director and "0" for an executive chair.

The reliability and validity of the data are examined through descriptive statistics and various data distribution techniques. The reliability of the constructs of DI and WDI is illustrated in 3.1 below. Statistical tests applied include those that may mitigate the statistical problems associated with non-normal data. The data set is large with 439 firms. To determine non-normal data distributions and the lack of significant multi-collinearity between variables included in the model, descriptive statistics and correlation tests, the Pearson correlation coefficients and the Spearman's Rank Order correlation coefficient (rho) (p) are conducted. Furthermore, variance inflation factors (VIF) are run to further confirmation of the lack of significant multi-collinearity. STATA is applied in conducted the statistical tests using non-parametric tests that include pair-wise correlation tests, SWILK test (Shapiro & Wilk, 1965) for normal data and rank regression analysis, and parametric tests that include the robust OLS multiple regression analysis and the quantile regression (QREG) model that may mitigate the statistical problems associated with this data set. In the next section, the results of the descriptive statistics are tabled.

3. Results

3.1 Descriptive Statistics and Correlation Tests

The construct of existence of an IC attribute (DI) and the construct of competitive advantage (WDI) are applied as the measures of the dependent variable for Models I and II. The results of the descriptive analysis of DI and WDI are presented in Tables 3.1 and 3.2. These results illustrate DI has a range of 0.09 to 0.86, with a mean of 0.48. The range for WDI is 0.07 to 0.75 and the mean is 0.33. For both DI and WDI, the mean and median are similar and the standard deviation is marginal indicating that the content analysis methodology was appropriate and reliable in measuring disclosure in DI and WDI; the results suggest normal distribution for both DI and WDI.

As WDI<DI, 48% of IC attributes were disclosed, whereas only 33% of ICCA attributes were disclosed as such, fewer attributes are competitive advantage related. The main attributes disclosed include brands (60 per cent), company names (80 per cent), distribution channels (74 per cent), business collaborations (69 per cant) and favourable contracts (59 per cent). This finding is not comparable with Australian voluntary reporting practices (Guthrie and Petty 2000) however, it is comparable with the Irish one (Brennan 2001) and the Italian one (Bozzolan 2003). As is expected from the analytical framework, less attributes are disclosed under WDI than DI illustrating a differentiation in the quality or VDIC.

The partial correlation (COR) provides evidence that consistent with the predicted sign, variables SALES, MVTA, TMRK, SIC, EMPC and CNED are associated with ICCA attributes. The results of DI and WDI are consistent with GEAR being the only variable not associated with VDIC in both WDI and DI variations. On the one hand, GEAR is likely to discipline mangers' self serving behaviour and reduce agency costs; on the other hand, GEAR is likely to reduce funds available for investment in R&D and EMPC. The partial correlation matrix indicates that large companies signal their competitive advantage as they disclose their "hidden value" consistent with the variable MVTA as IC may otherwise remain invisible to shareholders and investors. This is consistent with Firth (1979) and Lang & Lundholm (1993 as these firms have available the necessary resources to establish IC reporting structures aimed at reducing information asymmetry and uncertainty in these IA intensive firms.

EMPC is associated with VDIC; companies signal the value of HC in generating competitive advantage. Investment in EMPC may have two positive outcomes; firstly, an increase in quality of staff and an improvement in motivation and loyalty and secondly, an improvement in innovation and creativity with respect to new product and service development. Both positive outcomes are generally intangible in nature and particularly before commercialisation. As such the onus is on firms to signal both the possession of IC as well as the increase in competitiveness in the product market or the reduction in production costs as a result of innovative re-engineering processes. Investment in HC is therefore essential fir firms to maintain their competiveness.

In Models I and II, GEAR is not a significant component of financial risk within the univariate analysis; nevertheless, its inclusion is significant within the multivariate analysis suggesting that it is an important control variable. Consistent with the RBV, SALES is generated by both tangible and intangible assets and is found to have a positive association with GEAR. Firms that are highly geared are likely to have tangible assets applied in generating revenue. In addition, the RBV provides a basis for the explanation for the significant negative association between GEAR and MVTA. The hidden value of firms is associated with IA rather than with GEAR and tangible assets. Thus , the existence of "hidden value" accompanied by large sales revenue and reduced gearing is sufficient motivation for companies in high technology and innovative industries to disclose IC. These companies do not rely on debt to finance their operations as they lack adequate debt security due to the specificity and non-tradability of their assets. Consistent with Tables 3.1 and 3.2, industrial trends are determinants of VDIC as suggested by the significant association between VDIC and SIC. The positive association with TMRK is based on the high IC required for membership that is found in technological, innovative and R&D intense companies. Similarly, SIC differentiates companies on a basis of technology content and complexity. Firms that are basic industry have relatively less IA and more tangible assets. These tangible assets are easily visible whereas the more service, non-manufacturing and innovative complex firms have less visible resources as illustrated in industry disclosure studies by Bozzolan et al. (2003) and Brennan (2001).Within industries, competitive forces may limit disclosure in particular where barriers to entry may be low; other firms may thrive and signal the existence and potential benefits of investment in technology and innovativeness. The variable CNED exhibits a negative association. An association thus exists between EXPRCD and WDI, consistent with the monitoring role of NONEXEC that is hypothesised to reduce agency costs through IC disclosure. Disclosure is enhanced with the separation of the dual role. Such segregation of duties firstly, improves the monitoring and control role of the various sub-boards in which non-executive directors sit; secondly, reduces agencies costs associated with a dominant chair; thirdly, enhances the effectiveness of non-executive directors and fourthly, reduces conflicts of interest between performance benchmarking and performance evaluation. Size and CNED illustrate that larger companies generally separate the executive roles of chair and NONEXEC and may be due to the availability of more resources in larger companies. EXPRCD are associated with less remuneration for employees that may be attributed to their monitoring and control function, in addition, EXPRCD may be seen to encourage the appointments of chairs who are NONEXEC consistent with their own roles as NONEXEC.

Table 2. Model I (WDI)

Variable	Mean	SD	Min	Max	COR		1		2		3		4	5	6	7		8		9
WDI	0.330	0.130	0.070	0.750																
1 SRWDI	0.561	0.118	0.265	0.866			1													
2 LNSALES	5.811	2.013	0.501	11.404	0.414	***	0.278	***	1											
3 MVTA	1.164	1.180	0.070	10.880	0.173	***	0.144	***	-0.237	***	1									
4 GEAR	0.931	12.379	-6.820	259.530	-0.060		-0.023		0.062		-0.045		1							
5 TMRK	0.164	0.371	0.000	1.000	0.305	***	0.217	***	-0.284	***	0.240	***	-0.025	1						
6 SRSIC	71.609	16.575	14.213	95.969	0.234	***	0.165	***	-0.142	***	0.040		0.070	0.032	1					
7 EMPC	48.210	302.911	0.000	6,323.900	0.144	***	0.112	**	0.003		0.031		-0.006	0.003	-0.069	1				
8 SREXPRCD	0.595	0.226	0.000	1.622	0.110	**	0.081	*	-0.018		0.025		-0.018	0.056	0.081	*	-0.116	**	1	
9 CNED	0.522	0.500	0.000	1.000	-0.122	**	-0.121	**	-0.121	**	0.014		-0.050	0.055	-0.023		-0.045		0.318	***	1

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the person correlation matrix of the disclosure index (WDI) and the independent variables;

The annotation *** indicates results significant at a 0.01%, **, at 0.05% and * at 0.10% levels of significance;

Variables transformed by square roots are prefixed with SR; Variables transformed by logs are prefixed with LN.

SRWDI: weighted disclosure index based on disclosed ICCA attributes measured as a square root transformation;

LNSALES: Size being the sum of net sales or revenues representing gross sales and other operating revenue less discounts, returns and allowances as a log-transformed variable;

MVTA: ratio of market value to total assets;

GEAR: total debt / total capital % (long term debt + short term debt & current portion of long term debt) / (total capital + short term debt & current portion of long term debt) * 100;

TMRK: dichotomous variable that scores "1" for listing on the TechMARK listing and "0" otherwise;

SIC: standard industry classification measured as a square root transformation;

EMPC: staff costs including all employee benefits such as health insurance and pension plan contributions / number of employees (representing the number of both full and part time employees of the company);

EXPRCD: ratio of experienced non-executive directors to total directors measured as a square root transformation;

CNED: dichotomous variable that scores "1" for a chair who is a non-executive director and "0" for an executive chair.

Table 3. Model I (DI)

Variable	Mean	SD	Min	Max	Cor		1		2		3		4	5	6		7		8		9
DI	0.480	0.140	0.090	0.860																	
1 SRDI	0.684	0.108	0.300	0.927			1														
2 LNSALES	5.811	2.013	0.501	11.404	0.466	***	0.384	***	1												
3 MVTA	1.164	1.180	0.070	10.880	0.130	***	0.073		-0.237	***	1										
4 GEAR	0.931	12.379	-6.820	259.530	-0.054		-0.017		0.062		-0.045		1								
5 TMRK	0.164	0.371	0.000	1.000	0.267	***	0.145	***	-0.284	***	0.240	***	-0.025	1							
6 SRSIC	71.609	16.575	14.213	95.969	0.108	**	0.039		-0.142	***	0.040		0.070	0.032	1						
7 EMPC	48.210	302.911	0.000	6323.900	0.136	***	0.111	**	0.003		0.031		-0.006	0.003	-0.069		1				
8 SREXPRCD	0.595	0.226	0.000	1.622	0.122	**	0.074		-0.018		0.025		-0.018	0.056	0.081	*	-0.116	**	1		
9 CNED	0.522	0.500	0.000	1.000	-0.138	***	-0.140	***	-0.121	**	0.014		-0.050	0.055	-0.023		-0.045		0.318	***	1

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the person correlation matrix of the disclosure index (WDI) and the independent variables;

The annotation *** indicates results significant at a 0.01%, **, at 0.05% and * at 0.10% levels of significance;

Variables transformed by square roots are prefixed with SR; Variables transformed by logs are prefixed with LN.

SRDI: disclosure index based on disclosed IC attributes measured as a square root transformation;

LNSALES: Size being the sum of net sales or revenues representing gross sales and other operating revenue less discounts, returns and allowances as a log-transformed variable;

MVTA: ratio of market value to total assets;

GEAR: total debt / total capital % (long term debt + short term debt & current portion of long term debt) / (total capital + short term debt & current portion of long term debt) * 100;

TMRK: dichotomous variable that scores "1" for listing on the TechMARK listing and "0" otherwise;

SIC: standard industry classification measured as a square root transformation;

EMPC: staff costs including all employee benefits such as health insurance and pension plan contributions / number of employees (representing the number of both full and part time employees of the company);

EXPRCD: ratio of experienced non-executive directors to total directors measured as a square root transformation;

CNED: dichotomous variable that scores "1" for a chair who is a non-executive director and "0" for an executive chair.

Overall, the results indicate that companies with "hidden value", consistent with companies in more complex industries, that remunerate employees well provide substantially more VDIC. These companies have separate executive roles between chair and non-executive director and favour relative more appointments of EXPRCD. The results of the Pearson correlation indicate consistency of results with those of the partial correlation matrix for WDI. The results of DI provide different results, MVTA, SIC and EXPRCD are not associated with VDIC in the Pearson correlation matrix although significant in the partial correlation matrix. Larger companies are associated with lower levels of "hidden value" however it is the smaller companies that are associated with industries involved in technological and innovative operations as well as more complex service orientated activities. TMRK listed companies have higher levels of "hidden value" consistent with both WDI and DI, in the partial and Pearson correlation matrices. The next section discusses the results of the multivariate analysis.

3.2 Multivariate Analysis

The results of Model I & II indicate that SALES, MVTA, GEAR, TMRK, SIC, EMPC, EXPRCD and CNED are significant determinants of the level of VDIC. Generally, all variables are significant in all variants of Model I and II, WDI and DI, OLS and QREG models with the exception of SIC which is insignificant only in the QREG model applying DI as the disclosure index. These results are consistent with the parametric tests of Tables 3.1 and 3.2, GEAR however, which is negative in the tests of association, is positive in the regression analysis. The results of the sensitivity analysis that introduce the dummy industry variables into the OLS and QREG models are consistent between WDI and DI variants. The results of Model I and II have returned significant F-statistics, confirming the existence of a strong linear relationship. First, as reported in Table 3.3 the necessary conditions for IC disclosing companies are retained in the results of the dummy variables; larger companies signal hidden value generated by investment in employees and generally characterised by lower financial risk. These determinants are consistent, irrespective of the industry variables applied whether industry classifications or dummy industry variables and whether the quantitative index (DI) or qualitative index (WDI) is applied. EXPRCD and CNED provide weaker support in the weighted index. Nevertheless, the QREG model provides a significant result indicating that NONEXEC with experience attained through cross-directorships, provide transparency, accountability and monitoring through IC disclosure. Companies that have separated the executive roles of chair and NONEXEC are characterised by higher levels of IC disclosure. Larger companies may have such resources to enable the segregation of these functions. Overall, DI provides support for WDI; the results of DI indicate that there is a significant difference between the quantitative and the qualitative indices in the multivariate analysis; the insignificant result in the OLS model and weak association in the QREG model for variables EXPRCD and CNED illustrate that disclosure indices are based on different constructs. Second, in Table 3.3, industry variables TMRK and SIC are consistent in basing their association with VDIC on ascending IC content; TMRK on increasing third party recognition of IC content and SIC on increasing service activity and complexity. In Table 3.3, both the OLS and QREG models provide results consistent with respect to these industry variables; these industry reporting trends are mirrored in the results of the dummy variables as reported in Table 3.4; coefficients in both the OLS and QREG model are consistent in terms of basic, engineering and retail sectors having the lowest coefficients and computer, services and electric having the highest coefficients. The order of significance is maintained in both the OLS and QREG models consistent with expectation that the more basic resources, manufacturing, less complex and retail organisation may be expected to disclose less IC than those organisations associated with more processing, non-manufacturing activities, more complex and service organisations that are characterised by greater VDIC. Table 3.4 illustrates that industries that are significant in disclosing the most IC attributes under the OLS and QREG models pharmaceuticals, electrical, services and computers are industries associated with innovation and technological economic activities. Although coefficients of the dummy variables in the QREG model are negative, the research examines the order in the size of the coefficients to establish their relative positions in their influence on VDIC. All variations of Model I & II are consistent in illustrating that industries with IC content generally disclose more IC than those without. In the next, section the research examines the results of the individual independent variables in order to confirm the hypothesised influence on VDIC.

Model I & II confirm that large firms benefit from the signalling IC; being large and having access to more resources, larger companies are able to institute barriers to entry thereby mitigating the risk of competitive costs. Signalling theory raises an expectation of management's behaviour. Successful management practices are more likely to be advertised informing markets of the firm's competitive advantage in expand markets, building and maintaining customer relations and maintaining and expanding distribution channels. The results are consistent in all variants of Model I & II. The result suggests that as a proxy for IC intensive companies, MVTA is associated with VDIC that signals the existence of equity value not accounted for in the traditional reporting

framework. Signalling theory explains that management may be motivated to disclose more IC when the MVTA ratio is larger. This explanation is supported as service, high technology, R&D and computer and software development companies are more disadvantaged by current accounting regulations than are traditional tangible assets based companies, being IC intensive there companies are expected to have a higher MVTA ratio that may proxy for the difference between intangible and tangible asset based equities. The proxies for this "hidden value" MVTA has been found to be positive and significantly associated with VDIC in both the partial and Pearson correlation matrices and in both the OLS and QREG models.

The results of Model I & II indicate that the higher the proportion of debt in a company's capital structure, the lower the disclosure of IC. Highly geared companies apply debt to finance expansion and purchase of long-term tangible assets. The financial risk associated with such debt levels does not lead to VDIC. Debt providers may demand specific information through alternative channels particularly when the level of financial risk increases. The explanation for this negative result may be based on agency theory that proposes motivation based on management reducing VDIC to facilitate project turnaround tactics that may sustain their positions and /or sustain the perception of success.

Table 4. OLS AND QREG Regression - Model I

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR - \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIC + \beta_7 TMRK + \beta_8 SIZE + \varepsilon \quad (1)$$

Model V : Dependent Variable WDI DI

		OLS		QREG		OLS		QREG	
Independent Variable	Predicted sign	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Constant	+	0.258	***	0.261	***	0.446	***	0.460	***
LNSALES	+	0.025	***	0.023	***	0.026	***	0.026	***
MVTA	+	0.016	***	0.020	***	0.011	***	0.012	**
GEAR	-	0.000	***	0.000	***	0.000	***	0.000	***
TMRK	+	0.092	***	0.098	***	0.073	***	0.075	***
SRSIC	+	0.001	***	0.001	***	0.001	**	0.000	
EMPC	+	0.000	***	0.000	***	0.000	***	0.000	***
SREXPRCD	+	0.053	**	0.091	***	0.053	**	0.065	**
CNED	-	-0.026	**	-0.046	***	-0.027	***	-0.045	***
Mean VIF		1.09				1.09			
Z		0.21		0.56		0.17		0.67	
F		0.53	***	0.35		0.56	***	0.32	
Adj. R^2		0.27		0.17		0.27		0.16	
N		439		439		439		439	

Notes: Numbers in parentheses are t-statistics based on White's (1980) heteroscedasticity consistent estimation matrix.

Significance levels (one-tailed test except intercept terms): *** p< .01; ** p < .05; * p < .10

Table 5. OLS AND QREG Regression - Model II with Dummy Industry Variables

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR - \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIZE + \beta_7 BASIC + \beta_8 ENG + \beta_9 ELEC + \beta_{10} PHAR + \beta_{11} RET + \beta_{12} COMP + \beta_{13} SERV + \varepsilon \quad (2)$$

Model V : The Full Model with Dummy Industry

WDI DI

		OLS		QREG		OLS		QREG	
Independent Variable	Predicted sign	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
Constant	+	0.314	***	0.283	***	0.464	***	0.460	***
LNSALES	+	0.024	***	0.024	***	0.025	***	0.025	***
MVTA	+	0.015	***	0.012	**	0.011	***	0.014	***
GEAR	-	-0.001	***	-0.001	***	0.000	***	0.000	***
EMPC	+	0.000	***	0.000	***	0.000	***	0.000	***
SREXPRCD	+	0.037		0.045	*	0.044	**	0.071	***
CNED	-	-0.018	*	-0.025	**	-0.022	**	-0.035	***
BASIC	?	0.01		0.049	**	0.019		0.029	
CHEM	?	(dropped)		(dropped)		(dropped)		(dropped)	
ENG	?	0.00		0.025		-0.009		-0.011	
ELEC	?	0.11	***	0.146	***	0.088	***	0.096	***
PHAR	?	0.20	***	0.224	***	0.126	***	0.111	***
RET	?	0.00		0.014		-0.013		-0.035	
COMP	?	0.12	***	0.152	***	0.067	***	0.055	**
SERV	?	0.12	***	0.142	***	0.069	***	0.059	**
Mean VIF		2.05				2.05			
z		0.27				0.49			
F		0.56	***			0.37	***		
R^2		0.40		0.25		0.33		0.21	
N		439		439		439		439	

Notes: Numbers in parentheses are t-statistics based on White's (1980) heteroscedasticity consistent estimation matrix.

Significance levels (one-tailed test except intercept terms and industry dummies): *** p< .01; ** p < .05; * p < .10

Furthermore, by perpetuating this position, increased asymmetric information leads to more agency costs. Generally, tangible asset intensive companies tend to be concentrated in manufacturing and less-technological industries that are characterised by less VDIC. In addition, tangible asset based companies may have the physical assets against which debt may be secured, unlike IC intensive companies that may have to rely on internal generated capital or equity finance thus rendering their gearing ratios to lower levels. With increasing insolvency risk, management may be expected to focus on short-term projects to the exclusion of R&D. VDIC is expected to decrease as gearing increases and as the investment in IC decreases. Despite both the Pearson correlation and the partial correlation coefficients, returning insignificant results the expectation of a negative association has been confirmed by both the OLS and QREG models in the multivariate analysis and in both WDI and DI.

Members of the TMRK listing are expected to disclose higher levels of IC. Bozzolan et al. (2003), Williams (2001) and Cooke (1989 and 1992) presented significant results on this association. TMRK is positively associated with the extent of VDIC in all variants of Model I & II consistent with the expectations raised by the signalling theory approach. The results of Model I & II indicate that the industry classification SIC is associated with WDI in the partial correlation, the Pearson correlation, the OLS model and the QREG model. These results confirm that TMRK may be sufficient in controlling for industry reporting trends. Signalling theory may explain management behaviour in service and highly complex companies; these firms are expected to apply IC, unique to their organisation and therefore not easily replicable.

The results illustrate that investment in HC enhances VDIC. This investment may be attributed to higher levels of education, more experience and highly complex professions. The expectations for management behaviour are

based on signalling theory. Proprietary costs may be limited by the benefits of signalling and by the disclosure of "better than the worst case scenario" that the markets would have assumed in the absence of disclosure. The expectation of a significant positive relationship is confirmed. Effective human resource practices are expected to lead to signals that indicate a competitive labour force for the markets.

Model I & II confirms the hypotheses of a positive significant relationship between VDIC and EXPRCD. The multivariate analysis illustrates that the proportion of EXPRCD is significant in explaining the variation in VDIC (Table 3.3). Both the OLS and QREG models provide consistent results, in addition the qualitative and quantitative indices support the significant association. In Table 3.4 however, the OLS model provides a weaker result for the dummy industry variables; this result indicates that EXPRCD may be insignificant in the disclosure decision for electrical, pharmaceutical, computer and service companies. Nevertheless, the QREG model provides better results and in both the OLS and QREG models, applying DI as the dependent variable returns significant results. The association may be attributed to cross-directorships that provide experience and expertise. Furthermore, by enhancing transparency EXPRCD provide value relevant information comparable to that of other organisations (Dahya, Lonie & Power, 1998). The results confirm that EXPRCD have the intelligence, variety in information control and inside information to evaluate management and firm or industry specific information to add value. Although EXPRCD play a crucial role in the wider corporate governance role of limiting managerial discretionary behaviour and protecting shareholder interests, this monitoring role of EXPRCD is expected to reduce information asymmetry between management and shareholders, this expectation has been realised with respect to VDIC. The multivariate analysis indicates that non-executive chairs are associated with less VDIC, supporting the view that the position of chair and non-executive director should be separated. The results are consistent across the partial and Pearson correlation matrices, the OLS and QREG models and the variations of Model I & II with or without dummy industry variables. Where the roles of chair and NONEXEC are separate, increased VDIC may ensue. Alignment of shareholder and management objectives by executive chairs may lead to reduced agency costs. However, as CNED suppresses VDIC monitoring costs remain high. Asymmetric information creates additional agency costs. The literature is not consistent with which governance system is better. No studies have yet investigated this relationship within VDIC, although Ho and Wong (2001) established an insignificant result with dominant personality and Haniffa and Cooke (2002) established a negative and significant result with independent chair confirming that the roles of chair and non-executive director may be better separated. Forker (1992) concluded that combined roles in the executive signalled the absence of separation of decision management and decision control (Fama & Jensen, 1983). The results and the literature suggest that the combined role of CNED is likely to require increased monitoring.

4. Discussion

The article has illustrated the importance of VDIC and the benefits that are likely to accrue to firms when they take a proactive strategy to generate and report intangible assets. Nevertheless, certain market forces influence this process as a result of the demand for information from different stakeholders. Furthermore, the impact of external forces in some industries including political and regulatory, agency costs attributed to management's self interests, the absence of an internationally recognised IC framework, the importance of reporting credible information, the limitations imposed by competitive costs, the possibility of loss of competitive advantage and the risk of litigation has restricted the level of IC disclosure. As such, these additional disclosure costs render markets less efficient. Stakeholders are likely to encounter complexity in risk assessment, equity valuation and resource allocation unless VDIC reduces information asymmetries that may otherwise be exploited by internal agents and external analysts.

An investigation into the costs and benefits of disclosure by Gray and Roberts (1989) suggested that disclosure improves the image and reputation of the firm. Furthermore, it was established that disclosure provides better information for investment decisions, improves stewardship, transparency and accountability to shareholders, disclosure enables more accurate risk assessment and equity valuations. This article extends this work by examining the influence of investment in HC, financial risk, industry sector and corporate governance mechanisms in the context of IC financial reporting. Disclosure by UK companies mainly occurs with regard to RC (53 per cent) with particular attention to brands (60 per cent), company names (80 per cent), distribution channels (74 per cent), business collaborations (69 per cent) and favourable contracts (59 per cent). All variables are significant in one or more variant of Model I or II and explain the differences in reporting behaviour amongst UK companies.

With respect to VDIC, firms with "hidden value", high turnover, reduced debt, investment in employees, good governance and in complex technological, non-manufacturing and innovative industries have enhanced disclosures of IA. These firms disclose attributes that are valuable, rare, inimitable and non-substitutable as such

proprietary costs do not impact on management's disclosure policies and barriers to entry from a technological and innovative perspective may hinder new entrants. Regulators may focus attention on all firms with high MVTA ratios and take steps to encourage those associated with higher gearing and reduced debt to disclose more IC. Such policy changes are likely to reduce uncertainty in equity markets

Although content analysis as a methodology may prove to be practical and useful however it involves a large number of subjective "judgement calls". It is therefore important to have at least two readers reviewing the annual reports and comparing scores in order to establish a consistent framework. A longitudinal study of the extent of VDIC may disclosure more evidence on the practises of companies as in some years companies will disclose more information than in other years. Furthermore, studies to establish an international recognised framework for those IA and IC elements that are not recognised by any of the accounting regulatory bodies is urgently required. In addition, regulatory bodies should educate their members regarding the elements of IC and their positive effect on companies when disclosed in the annual reports. The benefits of such disclosure should be weighed by individual management against any potential drawbacks. Based on the limitations identified in this study areas for further research include, longitudinal studies, inclusion of more IC attributes from those recommended by the IASC and other regulatory bodies and the expansion of the study to include more company characteristics to identify those that would account for a higher explanatory adjusted R^2. The various IC components are closely related and are also intertwined with other firm resources. This interrelationship should be further investigated in order to be able to obtain a comprehensive insight into the cause and effect relations of the IC value-creation capacity. Specific attention should be paid to the influence of network relations

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Appendix 1: SIC Industry Codes and Dummy Variables

SIC Code		Industry	# of Obs
202	Basic	Forestry and paper	2
1589		Food producers and processors	18
1596		Beverages	6
1600		Tobacco	2
4521		Construction and bldg materials.	34
			62
2410	Chem	Chemicals	12
2463		Personal care and h'hold prods	5
5212		Household goods and textiles	14
			31
2840	Eng	Steel and other	2
2710		Engineering and machinery	24
3430		Automobiles and parts	10
3530		Aerospace and Defence	7
			43
3002	Elec	Info Tech Hardware	17
3210		Electronic and electrical equip't	16
4013		Electricity	3
4100		Utilities (Ex-electricity	8
5147		Diversified industries	6
			50
2441	Phar	Pharmaceuticals and biotech	14
			14
5211	Ret	General retailers	35
5211		Food and drug retailers	6
			41
7222	Comp	Software and computer services	31
7412		Support services	59
7420		Telecommunication services	12
7440		Media and entertainment	39
			141
6340	Serv	Transport	22
8511		Health	14
9210		Leisure and hotels	25
			61

Source: National Statistics (2003)

Basic: dichotomous variable that scores “1” for companies under SIC code 202, 1589, 1596, 1600 and 4521 and “0” otherwise;

Chem: dichotomous variable that scores “1” for companies under SIC code 2410, 2463 and 5212 “0” otherwise;

Eng: dichotomous variable that scores “1” for companies under SIC code 2840, 2710, 3430 and 3530 and “0” otherwise;

Elec: dichotomous variable that scores “1” for companies under SIC code 3002, 3210, 4013, 4100 and 5147 and “0” otherwise;

Phar: dichotomous variable that scores “1” for companies under SIC code 2441 and “0” otherwise;

Ret: dichotomous variable that scores “1” for companies under SIC code 5211 and “0” otherwise;

Comp: dichotomous variable that scores “1” for companies under SIC code 7222, 7412, 7420 and 7440 and “0” otherwise;

Serv: dichotomous variable that scores “1” for companies under SIC code 6340, 8511 and 9210 and “0” otherwise.