

**The Influence of Intellectual Capital Investment,
Risk, Industry Membership and Corporate Governance on
the Voluntary Disclosure of Intellectual Capital by
UK Listed Companies**

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Abstract

Purpose

This research examines the cross-sectional effect of intellectual capital investment, financial measures of market and company specific risk, industry membership and corporate governance on the extent of voluntary disclosure of intellectual capital (VDIC) in a sample of 443 *FTSE All Share Index* company annual reports for the year 2003/2004.

Methodology

The extent of disclosure is measured by a disclosure index (DI) based on intellectual capital (IC) attributes included in the narratives and illustrations of the annual reports. The research predicts that agency costs are mitigated by VDIC and that the benefits of signalling IC may outweigh competitive and proprietary costs that may be more prevalent in innovative and technological companies; furthermore, that effective corporate governance measures enhance VDIC particularly in those companies found to have a higher level of intangible assets (IA) in their resource base.

Findings

The results suggest that companies associated with less financial risk, reduced debt, higher levels of liquidity and accompanied by growth are characterised with higher levels of VDIC. Although less significant, the results on market risk indicate a positive influence on VDIC. Furthermore, the extent of VDIC in annual reports is enhanced when large companies operating in high-tech and innovative industries are characterised by investments in employees; in contrast, companies associated with research and development processes tend to be more secretive with respect to VDIC. 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 disclosure.

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Declaration

I declare that this thesis is all my own work and the sources of information and material I have used (including the internet) have been fully identified and properly acknowledged as required in the guidelines.

York, 4 March 2008

W. P. Mkumbuzi

List of Abbreviations

ASB	Accounting Standards Board
BETA	Beta risk factor
CEO	Chief Executive Officer
CNED	Chair who is a non-executive director
DI	Disclosure index
DIRSHS	Directors' shareholding
EC	European Community
EMPC	Employee cost
EXCREM	Executive remuneration
EXPRCD	Experienced non-executive directors
FTSE	Financial Times Securities and Equities
FRS	Financial Reporting Standard
FRC	Financial Reporting Council
GEAR	Gearing
GRWT	Growth
HC	Human capital
IA	Intangible assets
IASC	International Accounting Standards Committee
IAS	International Accounting Standard
IC	Intellectual capital
ICAEW	Institute of Chartered Accountants in England and Wales
ICCA	IC competitive advantage
ICF	IC Framework
IFAC	International Federation of Accountants
INDG	Industry Grouping
IP	Intellectual property
LQD	Liquidity
LSE	London Stock Exchange
MANUF	Manufacturing
MV	Market value
MVBV	Market value to book value

List of Abbreviations (cont)

MVTA	Market value to total assets
NONEXEC	Non-executive directors
OECD	Organisation for Economic Cooperation and Development
R&D	Research and development expenditure
RC	Relational capital
SC	Structural capital
SIC	Standard Industrial Classification
SRDI	Square root of DI
SRWDI	Square root of WDI
SWILK	Shapiro-Wilcox test
TA	Total assets
TMRK	Membership of the FTSE TechMARK listing
TF	Theoretical Framework
UK	United Kingdom
VDF	Voluntary Disclosure Framework
VDIC	Voluntary Disclosure of IC
WDI	Weighted Disclosure Index

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1 Introduction

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1.1.0. Introduction

It is generally accepted that the increase in intangible assets (IA) in the equity of companies has led to complexity in financial reporting. Intellectual capital (IC) reporting has been mired by traditional financial statements not effectively reporting the existence and value of these IA. Compounding the issue as reported by Lev and Zarowin (1999 p.383), book values in financial statements are largely unrepresentative of equity. This complexity may explain the equity market's focus on both quantitative and qualitative disclosures included in the annual reports. As the proportion of IA increases in the equity of companies, the uncertainty attached to its financial reporting increases. Companies invest in IA resources to leverage the competitiveness of their organisations. There appears to be a broad acceptance that inimitable IC resources applied to generate innovativeness in products and services are the key drivers of competitive advantage, growth and market value. Incentives exist therefore for companies to develop those characteristics that set themselves apart from their competitors and to signal their competitiveness. There has been a steady shift by investors and analysts towards analysing qualitative disclosures in particular for companies whose value remains hidden from the market.

In response to these demands for information, companies formulate policies that identify and report IC that is generated by the organisation. These policies maintain and disclose important sources of IC including research and development (R&D), sources of innovation and skilled human resources. However, investment in IA attracts a certain element of risk. The process of development of IC and the realisation of increased returns and share price value are lengthy and uncertain. As such, communication of these IC processes to the public may be essential if this uncertainty is to be mitigated; however, companies face significant hindrances in their attempts to disclose the existence of IA. Companies have grown increasingly aware of the importance of disclosing IC and the perceptions that credible favourable disclosures have on the market. As such, narratives and qualitative reporting has been applied in disclosing IC in addition to explaining in part the difference between market and book value. Insufficient IC information may be problematic with respect to the market's identification, analysis, valuation and therefore differentiation of

superior and inferior market participants. The onus is therefore on companies to make this information available. Some may expect standard setters and regulators to take a leading role in encouraging voluntary disclosure of intellectual capital (VDIC); however, their roles are restricted by the inherent nature of IC that makes its identification, measurement and reporting complex. IA are more associated with this complexity than other types of assets such as physical and financial assets due to the high uncertainty in their value, ill-defined legal and ownership rights and the lack of active markets to provide reliable value estimates (Lev 2001). Thus, as regulators are unable to set minimum reporting standards, the onus is placed on companies to provide the necessary conduit for these IC disclosures; the annual report, that takes the form of words, sentences, pictures and diagrams, has been gaining importance as a means of communicating this IC. Whereas, the traditional reporting model places focus on quantitative audited financial statements, the approach adopted by this research examines quantitative, qualitative, narrative and non-narrative disclosures.

Companies recognise the importance and economic benefits to be derived from a well-managed disclosure policy (Williams 2001). As this IC is not visible, the existence of adequate structures for identifying, measuring, managing and reporting IC may be invaluable. Corporate governance mechanisms may assist in ensuring transparency and accountability through the provision of complete and credible IC disclosure. Furthermore, this process is likely to be influenced by the nature of the management culture and their risk attitudes towards IC investment, the nature of the business, its industry membership and the existence of monitoring and controlling mechanisms. This accountability and transparency may result in the disclosure of such categories of IC as structural capital (SC), relational or customer capital (RC) and human or employee capital (HC). Additional disclosure is likely to reduce uncertainty about future prospects of a company and to facilitate a more precise valuation of the company (Botosan 1997). It has been suggested that the culture, style and composition of the governing bodies that report on the financial position and provide additional information in the narratives of the financial statements may be as important to financial markets as the information actually reported. Such additional information may supplement mandatory regulations with voluntary

disclosure to ensure information asymmetry is reduced between internal and external stakeholders and that equity risk is minimised.

Although market forces may lead to IC disclosure due to demands by external forces, the absence of a framework for IC, the historical nature of the financial reporting framework, the necessity to disclose credible information, the threat of loss of competitive advantage and the risk of litigation from inaccurate reporting has restricted the level of IC disclosure. As such, these additional disclosure costs render markets less efficient particularly in risk assessment, equity valuation and resource allocation. VDIC may reduce information asymmetries that may otherwise be exploited by internal agents and external analysts by: - reducing information acquisition costs, establishing a recognised IC framework, reporting IC in the narratives, ensuring corporate governance measures provide accurate information, reducing disclosure costs and by providing benefits for the signalling of company competitive advantage. This research acknowledges that credible disclosure provides better decision making for all stakeholders by reducing the gap between the market's valuation of IC and the intrinsic value. IC disclosure in particular breaches the gap created by the "hidden value". Credible disclosure provides an alternative means of assessing value not incorporated in the balance sheet. Such disclosure provides transparency and accountability in the governing body by providing more information on the processes involved in developing competitive advantage through investment in IA. This research investigates how the creation, management and disclosure of IA influences financial reporting and investigates the determinants of IC disclosure in terms of the interaction of heterogeneous asset and governance firm characteristics. Specifically this research considers the investment in IC, the effectiveness of the firm's corporate governance mechanisms and its structures of accountability. Moreover, this research shows that by adopting the RBV approach, investment in and disclosure of IC enhances competitive advantage. At the same time, systematic risk increases as a function of the investment in IA that might typically be expected to be associated with higher fixed costs.

Previous literature has examined the separate effects of resource attributes on IA disclosure (Archambault and Archambault 2003 and Citron *et al.* 2005), the role of such disclosures as signals (Bozzolan *et al.* 2003 and

Garcia-Meca *et al.* 2005) and the possession of intangible resources and their impact on firm performance (Hayton 2005). Taken together the results of prior empirical studies are suggestive of investment in intangible resource and their disclosure through transparent governance structures as being mechanisms to secure competitive advantage. A theoretical framework is suggested linking disclosure with the firm's asset base, specifically investment in IC and the effectiveness of the firm's corporate governance mechanisms and structures of accountability. This research then goes on to examine the likely impact of disclosures, once made, on the risk profile of the firm, with the expectation that disclosure will reduce the risk attributed to the equity. Furthermore, the theoretical framework proposes an association between investment in IC and membership of an innovative and technological industry. Industry membership is examined as a representation of the firm's asset base. Innovative industries may be characterised by higher levels of intangible resources and manufacturing companies may be characterised by more resources that are tangible. These propositions are tested using a cross-sectional analysis of a large sample of disclosures made by United Kingdom (UK) firms.

Disclosures of intangibles are a function of the firm's competitive strategy and the requirement to signal the presence of assets likely to create competitive advantage to capital markets. Sustained competitive advantage is defined as delivering sustainable above-normal returns (Peteraf 1993) and is likely to be achieved because of the possession of unique assets. According to the theory of competitive heterogeneity such assets might be tangible, but possessed by one firm and not another as a result of monopolistic market conditions. In contrast, according to the resource-based view of the firm (RBV), and in particular, the knowledge-based view of the firm Grant (1996), sources of sustained competitive advantage are located in assets that cannot be purchased in a market. The RBV explains the competitive advantage of organizations in terms of bundles of resources (Amit and Schoemaker 1993 and Rumelt 1984), which are valuable, rare, inimitable and non-substitutable (Barney 1991). Super-normal profits consistent with the organisational aspects of sustained competitive advantage (Barney 1991) arise from the firm and include specific assets, managerial economies of scope and organisational

mechanisms of co-ordination (Penrose 1959, Teece 1980 and Coff 1997)¹. As the firm invests in assets such as specialised production facilities, trade secrets and engineering experience (Teece *et al.* 1997) over time (Dierickx and Cool 1989), tacit knowledge is embedded in technically complex routines. According to the knowledge-based view, sustained competitive advantage arises from such routines (Spender 1989 and Nonaka 1991). Such assets typically have intangible characteristics and accordingly the RBV approach is adopted here as a tool for analysing intangible disclosures, typically linked to firm value creation.

These intangibles coupled with firm-specific capabilities provide sustained competitive advantage through quality services and products and through frequent and value creating innovation. Competitive advantage is sustained through a lowering of transaction costs through trust, relational capital, coordination and communication with external stakeholders for the support of superior performance. In building this corporate culture, these management processes are matched by an increase in the risk attributable to R&D activities. The risk associated with intangible asset generation through R&D activities is on average three times greater than the risk associated with investment in property, plant and equipment (Lev 2001). This risk is indicative of uncertainty and may be mitigated by reducing asymmetric information through greater disclosure of intangibles. Not all R&D activities lead to intangibles; not all intangibles lead to sustained competitive advantage; nevertheless, both the competitive advantage derived from successful R&D and the in-place firm strategies that mitigate the inherent risk in R&D activities may be conveyed to the markets through disclosure.

Intangible, as opposed to merely heterogeneous resources may therefore be more likely to be disclosed to the capital market as signalling devices. The monopolistic possession of tangible resources, for example a telephone cable network, is likely to be well known by competitors, investors and regulators and is therefore less likely to be the subject of further elaboration in the annual report. Conversely, the creation of RBV intangibles, for example investment in

¹ Investment in strategic human resource assets (Mueller 1996 and Wright *et al.* 1994) is a sufficient but not a necessary condition for realised super-normal profits, since the employment of such assets simultaneously leads to the creation of internal rent appropriation possibilities.

organisational and technical processes, is likely to be less well understood by capital market monitors, creating a potential moral hazard and information asymmetry problem; the logical solution to which is enhanced accounting disclosure. Moral hazard and information asymmetry problems may be exacerbated by the mendacious but unverified claims of inferior firms to have made equivalent investments to their competitors, thereby staking a claim to inequitable shares in superior profits. There is thus a quality signalling rationale (Akerlof 1970, Spence 1973 and Healy and Palepu 1993) for disclosure of investments in intangibles. Toms (2002) uses this approach to link quality signalling using accounting disclosure to the RBV. More fundamentally, where such investments have occurred, in the absence of disclosure there is no alternative mechanism for the capital market to adjust returns to reflect the abnormal profits associated with sustained competitive advantage.

Relatively little explicit use has been made of RBV in accounting research in general and with reference to intangible disclosures in particular. There are however, some interesting results associated with certain resource attributes of the firm. Intangible disclosures need to be informative with respect to the outcomes of the R&D projects. Generally, information contained in the annual report of R&D activities does not normally provide any new or vital information due to commercial prudence (Nixon 1997 p. 274). However, the conclusions in Nixon (1997) suggest that management views disclosure of R&D expenditure as key to capital market valuation in particular, for certain key industries, intangibles have become a key source of competitive advantage and more especially in the service and innovative industries (Marr *et al.* 2003).

Archambault and Archambault (2003) and Citron *et al.* (2005) find a strong positive association between disclosures and the number of SIC codes in the firm indicating the extent of firm diversification (Verrecchia 1983) that may lead to increased disclosure as companies seek to obtain a greater set of resources (Zarzeski 1996). These indications of positive association between the scope and complexity of the organisation's activities and disclosure are a useful starting point for a wider application of the RBV framework in conjunction with the signalling approach. Garcia-Meca *et al.* (2005) investigated signalling to analysts and concluded that better disclosures might be expected for companies operating in the financial sector. According to

signalling theory, such companies require the confidence of their customers to do business, and transparency is a key factor in gaining confidence. Bozzolan *et al.* (2003) endeavoured to explain intangible disclosures using signalling theory. The investigation centred on high-tec industries that invest heavily in intangibles; the results were indicative of the promotion of competitive advantage through disclosure of R&D and technological development processes. However, a significant limitation on any likely relationship between signalling incentives and disclosure is the notion of competitive cost. This results in competitors increasing their competitive advantage as a result of disclosure of information i.e. trade secrets, processes, products and reduces future earnings of the disclosing firm. Competition may restrict full disclosure of IC because it may lead to a potentially unfavourable change in future earnings (Dye 1985 and Guo *et al.* 2004).

Based on the discussions raised in this introduction, the next section presents the research questions that will be investigated in this thesis. Reference is made to agency theory, signalling theory and RBV. The RBV bases its argument on the existence of potentially valuable assets that are difficult to replicate. This characteristic inhibits firms within the same sector accessing information and R&D on new developments. These barriers to imitation may be created through IC's unique characteristics, legal protection, complexity, difficulty of replication and high levels of financial and human resources required for its development. The applicability of this approach is based on the unique resources that IC provides a company. The RBV highlights the competitive advantage of companies as based in their unique constellation of resources, tangible capital, human resources and organisational processes (Barney 1991). The resources that have been found to be especially valuable are those that are rare, durable, imperfectly inimitable, and non-tradable (Barney 1991 and Dierickx and Cool 1989). These resources include structural capital (SC), relational capital (RC) and human capital (HC). SC is generated mainly by unique R&D investment, RC by unique relations with customers and stakeholders and HC by a skilled, experienced and innovative workforce.

Management may follow a policy of maximum disclosure of IC where these intangible resources are prevalent. The market is expected to respond, more so, to new research than to the development of existing products,

processes and services. Performance measurement of R&D and unique product and service development activities is gaining increased importance because the effectiveness and efficiency of these activities not only determine a company's competitive advantage, but its very survival. Applying RBV to an environment where it is difficult to replicate IC, management may voluntarily disclose IC to illustrate their competitive edge and restrict voluntary disclosure in areas where no competitive advantage exists. In a market where barriers to imitation are high; duplication is restricted; successful projects may signal growth and VDIC may positively influence shareholder wealth maximisation.

On the other hand, where barriers to imitation are low and duplication of new technologies is commonplace, management recognises the need for secrecy due to proprietary costs. The existence of disclosure costs adequately accounts for this behaviour in the disclosure decision. However, where barriers to imitation may be high the potential competitive costs linked to proprietary IC may be reduced. The RBV fits well within this framework; being unique, IC resources may be patent protected, may require large financial and human capital resources, may take a lengthy process to develop and may be specific to certain processes, departments, companies or industries thus providing mitigating circumstances that may render disclosure costs minimal.

1.1.1. Research Questions

This research has identified the following key elements that require further investigation. The questions listed below are derived from the gaps that have been identified in the literature.

- (a) What are the resource attributes that tend to lead to competitive advantage reporting?
- (b) What are the market and financial risk characteristics that lead to IC reporting?
- (c) What resource attributes lead to technologically innovative industries disclosing more IC?

- (d) Which corporate governance mechanisms promote IC disclosure?

These questions are addressed below in section 1.1.2 in which a research objective is established for each research question. Four areas have been identified as significant in influencing IC disclosure; investment in IC, firm specific and market risk, industry membership and corporate governance. The questions have been modelled according to the RBV and signalling theory. Organisational resources may be instrumental in defining disclosure policy; these resources are represented by both tangible and intangible assets. Intangible assets have been associated with generating the competitive advantage of the organisation. Investment in these intangible resources varies from industry to industry and may thus be a determinant of the variation in IC disclosure patterns. The risk attached to investment in these intangibles may be expected to increase with an increase in the portion of resources attributed to intangibles. Lack of knowledge of the existence of these IC resources may create asymmetric information. However, it may be that effective corporate governance may mitigate this risk by ensuring organisational IC is adequately communicated. Furthermore, being intangible and complex to measure and report, possession and disclosure of the existence of these assets may be necessary for generating and maintaining competitive advantage.

1.1.2. Research Objectives

The main objective is to examine the effect of specific company characteristics on the extent of voluntary disclosure of intellectual capital (VDIC) for a sample of 439 UK companies selected from the London Stock Exchange (LSE) *Financial Times Securities and Equities (FTSE) All Share Index* for the year 2003/2004. Companies were selected for the year 2003/2004 as this was the last year before introduction of International Accounting Standards (IAS). This environment was suitable for examination of voluntary disclosure of IC given the impact that mandatory disclosure has on voluntary disclosure. Very little if any mandatory IC regulations existed in the UK during this period. The *Financial Times* publication was assessed as suited to the needs of this research

as it provides all listed companies in fitting alphabetical industry category; companies within industries are similarly listed alphabetically. This research establishes the current practice of reporting IC by UK listed companies by identifying the quantity and quality of IC attributes and IC categories reported by each of the selected companies. By documenting and analysing the current overall pattern of IC reporting among UK listed companies, this research empirically investigates the hypothesised influence of several independent variables on the extent of VDIC.

- (a) The influence of competitive advantage resources on the level of IC disclosure is determined by the financial measures of investment in IC as reported in the annual reports. Companies are investigated to determine whether this investment in competitive advantage resources is associated with VDIC.
- (b) This research places focus on the firm financial and market risk characteristics of companies and determines their influence on VDIC.
- (c) IC disclosure trends are identified with respect to industry membership; industries, representative of the variation in organisational resource base, are grouped into various classifications to determine the influence of particular industries on VDIC
- (d) The final objective is focused on corporate governance mechanisms. Their influence on the monitoring and control mechanisms of board appointments, board structures and procedures is evaluated in the light of VDIC.

These objectives focus on current issues that are important to the continued development and study of IC. The focus on IC investment examines the influence of the drivers of IA growth on VDIC. IC disclosure may be influenced by market and financial risk, in particular the uncertainty that may

be associated with future cash inflows emanating from IC investments. The management and governance of the company may influence the IC reporting framework in identifying, measuring and reporting IC. Companies within the same industry may follow selected reporting trends that meet the market's demand for comparable information amongst companies with similar economic activities. Technologically innovative activities may be expected to take place in certain industries. A classification of these industries may explain the variation in VDIC. Conflicts of interest within organisations require monitoring and control, the effectiveness of the board of directors in its function may influence the level of transparency and accountability and therefore the extent of VDIC.

1.2.0. Identification, Measurement and Reporting

The literature has suggested the little progress that has taken place in IC research has been due to the slow development of identification, measurement and reporting. The unique characteristics of IC particularly its intangible nature renders these processes complex and as such may continue to restrict the nature and depth of the development of the field if these issues are not addressed. Practitioners need to understand commercial terms for IC and management need to understand the definitions of IC referred to in academic research. A common ground favours the introduction of an IC framework that may mitigate the problems associated with the measurement of the construct of IC disclosure. Content analysis has been one technique that has been applied to account for IC attributes disclosed in annual reports. This research applies a quality-adjusted content analysis based on the comprehensiveness and competitiveness of the IC disclosure, consistent with the current shift in reporting as the importance of narratives, non-narratives and illustrations in communicating intangibles continues to grow. A differentiation is made within this research between a qualitative and a quantitative disclosure.

An IC attribute in the annual report does not measure the context, comprehensiveness or richness of information but identifies its disclosure or not. An ICCA attribute disclosure is defined by this research as the competitive advantage in signalling a unique product, service, process, IP, relationship or

human resource. This measure accounts for the context, comprehensiveness or richness of information reported. Two indices are developed in this research, the unweighted index and the weighted index representing IC attributes and ICCA attributes respectively. The ICCA disclosure index focuses on the difficulty in replicability of IC that is attributed to barriers to imitation. In this manner, the weighted and unweighted indices can be evaluated and compared in ascertaining whether the quality-adjusted index reflects the significance of competitiveness. Companies compete by erecting barriers in order to maintain their demand-side advantage or cost-side advantage (Abernathy and Clark 1995). Generally, any advantage generated from standard and tangible asset investment is easy for competing companies to imitate (Webster 1999) whereas that gained from IA is more unique, firm specific and more difficult to replicate. IA investments are often company specific making it difficult for companies to imitate. Hayton (2005) argues that IC offers a unique source of advantage that facilitates entrepreneurial activities by reducing the risk and increasing the returns from investment in innovation and venturing. Usoff *et al.* (2002) and Drucker (1993) identified the increasing role IC plays in creating value by achieving a competitive advantage in the market place; knowledge is attributed as the dominant economic resource for competitive advantage.

1.2.1. Accounting Investment in IC

The question that arises is why companies that invest in IC are more likely to disclose IC attributes in narratives, non-narratives and illustrations in the annual report. It may be that if companies were to disclose IC, it would be those that are most disadvantaged by the current financial reporting framework that places little emphasis on reporting market related equity. Given the intangible nature of IC and the inability of accounting regulators to mandate IC disclosure, few financial measures exist that can be regarded as truly representative of the actual IC value incorporated in equities. The historical nature of accounting figures limits their application in this respect. Nevertheless, the literature has illustrated that managements' efforts to attain competitive advantage have driven the investment in R&D considered a major driver of Intellectual Property (IP) and IA growth, driven the investment in and retention of human

resources in the development of HC and driven the investment in customers, suppliers and markets in cultivating RC. This increase in IC investment remains largely hidden, compounded by the complexity of measurement and reporting these investments may be invisible to both current shareholders and prospective investors. This complex relationship may be the cause of the lack of empirical research to support the assertion of the influence of R&D, growth, IC intensity and market value to book value with VDIC. Large more financially liquid companies may be able to spend more on competitive advantage resources and may signal this fact to the market through additional voluntary disclosures. In this manner, the total value of the company, both tangible and intangible may be captured in the share price. These potential explanations need to be confirmed through empirical tests on the hypothesised influence of financial measures on IC. No prior empirical evidence exists in the literature with respect to the association of financial measures of investment in IC and VDIC.

1.2.2. Financial Measures of Risk

The literature has in general acknowledged an association between successful R&D, Intellectual Property (IP) development and investment in HC with profitability; no link has been established between these indicators of IC and risk. Although capital market theory holds that investors are interested in risk and return, no direct investigation has considered whether management react by increasing VDIC when faced with higher levels of market or financial risk. Organisations with a larger proportion of their resources based in intangible assets may be associated with higher risk levels. More voluntary disclosures may enable easier assessment of the risk, return and the future prospects of such equities; disclosure may reduce the asymmetry between the organisation and the market. The processes of R&D, IC development and innovation require significant investment before any returns come to fruition. Such uncertainty leads to higher risk levels. The entrepreneurial and risk attitudes of management may influence the culture and philosophy of the organisation in facilitating an environment that is conducive for innovation and technological advancement. It is therefore important to know whether high-risk companies are associated with higher or lower levels of VDIC.

Certain actions by management may mitigate this risk, where VDIC reduces the uncertainty attached to future growth prospects, employee relations or market opportunities. Certain management actions or lack thereof may exacerbate the risk attached to the equity through mal-practice, non-disclosure of IC and therefore increasing asymmetrical information, incompetence, entrenchment practice, self-dealing and self-interests. Shareholders' monitoring activities may ensure that management do not expose the company to undue risk, further that company policies and procedures are followed in guiding management decisions. Shareholders may encourage VDIC to reduce the risk of uncertainty. Although markets are aware of the existence of IA, without sufficient information, placing a value on this IC is limited, due to the complexity and inability to forecast future growth.

Signalling of ICCA attributes that may generate future profits mitigates the risks associated with competitive pressures that are generally associated with reduced VDIC. On the other hand the financial resources required for the investment in IC may not be available to all, it may be that companies associated with more financial and insolvency risk may be unable access such resources; such risks may lead to less VDIC. The literature has been inconclusive as to the nature of the relationship between risk and disclosure. The empirical relationship may be unknown, as no previous IC study has examined risk in this context. Given the risk/return relationship, characteristics associated with the development of IC may provide above average returns in line with competitive advantage however, the risk and time associated with new service and product development may reduce the attractiveness of such opportunities.

1.2.3. Industry Membership

Companies appear to follow reporting trends that are dependent on their nature of business and economic activities. It is expected that VDIC may also be exposed to the same financial reporting characteristics that determine these trends. Technologically innovative companies firstly, may apply more IC in their operations and secondly, may disclose such IC in their annual reports. The nature of the industry and disclosure attributes may define the association; a

significant association between disclosure and manufacturing companies is revealed in Cooke (1992), with more voluntary and mandatory accounting attributes disclosed by manufacturing companies than by non-manufacturing companies. Whereas Cooke (1992) measures general disclosure, this research measures IC disclosure as such the levels of disclosure may differ.

In addition, disclosure has been found to vary with the complexity of operations between industries. The trend of this variation ranges from basic resource orientated companies to highly complex and specialised companies including manufacturing and non-manufacturing. The major business operation determines whether, as is the case for financial, utilities and raw material industries, more disclosure regulations should apply. These regulations arise due to the nature of trade and the level of public exposure, environmental and political pressure in these industries. Some companies may follow a herding behaviour in which some companies are the first to disclose and others follow this trend in a second wave of disclosures.

Consistent with the RBV approach, industry is utilised to differentiate companies based on the level of investment in tangible and intangible assets. There is a need therefore to establish the differential effects of various industries reporting trends on the VDIC. This is important for two reasons: to identify which industries have higher and lower levels of VDIC and secondly to identify the industry characteristics that influence these levels. The research therefore tests the hypothesis that different industries require different IC disclosure policies. From a practice perspective, standard setters and regulators can identify the industries that may require additional mandatory disclosure of IC and in addition, investors can identify secretive and potentially high-risk industries.

1.2.4. Corporate Governance Mechanisms

The focus on corporate governance is appropriate as disclosure and agency costs are inextricably linked; shareholders apply disclosure as a monitoring mechanism. The corporate governance function is responsible for formulating the strategic focus of the organisation. The important critical decisions involve monitoring management and accounting for the investment in IC (Keenan and

Aggestam 2001, p. 265). Additional disclosure may lead to a reduction in information asymmetry. Corporate governance may mitigate the risk due to agency costs. Corporate governance has become known as a significant force in predicting and explaining management behaviour in general disclosure studies. This research extends these investigations by establishing the existence of such a relationship within VDIC. Generally, corporate governance mechanisms influence management behaviour by providing incentives and punitive measures to achieve the desired attitudes and behaviour.

Fama and Jensen (1983) reported that the board of directors is the highest internal control mechanism responsible for monitoring management's activities. It may be that if management is about running the company, then corporate governance mechanisms may ensure that the business is run properly (Tricker 1984, p.7). Several specific board characteristics and actions can be hypothesised in predicting an expectation in disclosure policy: the constitution of the board itself including the nature of individual board members; the number and nature of non-executive directors appointed; the percentage of equity held by management, the separation of executive roles and the procedures and processes that the governance function oversees. Given the increased international call for transparency and accountability, investors expect corporate governance mechanisms that are designed to protect the interests of all stakeholders and therefore for management to accurately report the true financial position and business performance.

1.3.0. Contribution to the Area

This research adds to the accounting literature by firstly providing an up-to-date analysis of the IC reporting practices of UK listed companies. No study could be identified in the UK that used a multivariate statistical analysis to evaluate the impact of the nature and the number of the selected variables on VDIC. In this context, the impact of VDIC in the UK is therefore unknown and it has been discussed that few VDIC studies have been conducted internationally. Second, the extent and scope are new to the area of study as new methods have been applied and new frameworks developed including the voluntary disclosure framework (VDF), Intellectual Capital Framework (ICF) and theoretical

framework (TF). New independent variables have been introduced extending IC disclosure studies by increasing the count from an average of 3 to 18 company characteristics.

Third, the application of new sampling, attribute counting, statistical and analytical tools particularly in the development of a measure of competitive advantage through a weighted disclosure index and a measure of the extent of disclosure through an unweighted disclosure index, adds to the development of IC management and reporting studies. Thus, the competitive advantage index adds a new insight in the measurement of VDIC. In this respect, this research adds to IC content analysis studies by including diagrams and non-narratives to mere narratives in providing the first attempt at a methodological recording of the extent, content and style of IC and ICCA disclosure. Previous studies have ignored the inclusion of non-narratives and illustrations in compiling the disclosure indices. A gap therefore exists in our knowledge in respect of limitations on the extent and scope of prior studies.

Fourth, this study makes significant advances in the area of IC disclosure studies based on studies conducted in previous research that have been identified as limited in depth, scope and number of company characteristics investigated. The introduction of empirical tests to IC studies in the scale of this research has significantly added to the IC field; this research contributes to knowledge by pioneering the way forward in IC research on several fronts. The nature, size and extent of coverage of the data are unique to IC studies. The methodology, methods, quantitative and qualitative techniques applied in data analysis, statistical tests, parametric and non-parametric tests and data set analysis into transformed data are some of the fronts on which this research contributes to knowledge. This research therefore contributes to the growing literature on IC internationally and sets the foundation for further study within the UK. The contribution is made through a measure of disclosure, in developing various frameworks and in recording the extent to, and manner in, which, IC is disclosed through voluntary narratives, non-narratives and illustrations in the annual report.

In addition, a contribution is made by examining systematic links between the proportion, use and disclosure of IC attributes and the value of IC content in equities, market and firm specific risk associated with equities,

industry membership and the effectiveness of corporate governance mechanisms.

1.4.0. Research Outline

The remaining part of this thesis is divided into eight chapters. Chapter 2 discusses the literature review, establishes the VDF and the TF and develops an ICF by defining SC, RC and HC. This is the first time that such a VDF has been developed; the identification and differentiation of voluntary IC attributes and mandatory IC attributes has not been established within the UK. The chapter discusses how each of the company characteristics identified in the literature review is developed into testable hypotheses that are based on the TF. The variables investigated include size, growth, risk, IC investment, industry and corporate governance. Size and growth are introduced from the general disclosure literature. Risk, IC, industry and corporate governance are introduced as the focus of this research due to their potential influence on management's disclosure policy.

Chapter 3 discusses the research methodology; it explains the sampling procedure adopted and, how the IC attributes are identified, selected and coded. The chapter explains how the annual reports were scored and discusses the arguments for and against the weighting of the items disclosed. The final part of the chapter provides a descriptive specification of the statistical methods that are applied to test the relationship between the company characteristics and VDIC. Chapter 4 introduces the results of the empirical investigation and discusses the data set used to test the hypotheses in Chapters 4 to 8. It discusses the frequency analysis, disclosure index (DI) and weighted disclosure index (WDI), the descriptive statistics and IC and ICCA attribute disclosure at the industry and company level. This chapter also looks at the empirical analysis on the investment in IC. This research develops four hypotheses that are associated with management's investment in IC. The first two represent investment in HC and SC, consisting of investment in employees and in R&D respectively. High technology and innovative industry classifications are developed consistent with industries associated with IC intensive operations (SC, HC and RC) to provide the two remaining IC investment variables. Chapter 4 to 8 discusses the

results of the statistical analysis with view to identifying the influence of investment in IC, influence of financial and market measures of risk, the effect of industry membership and impact of corporate governance mechanisms on VDIC reporting practices respectively. The results of the empirical tests, both parametric and non-parametric are evaluated.

In Chapter 5, this research develops three hypotheses that are associated with financial measures of risk. The empirical tests determine whether there is any significant association with VDIC. Furthermore, the tests determine why the level of market and firm specific risk influence the disclosure of IC. Risk variables introduced are associated with financial risk, gearing and liquidity and investigate the influence of the financial structure of the company including the influence of the ability to meet long and short-term debt commitments. An additional risk variable introduced is market risk that relates to the influence on disclosure levels of asymmetrical information. In Chapter 6, this research introduces the development of the four industry variables. The classifications of these industry variables differ as two variables introduced are based on a dichotomous scale, one variable introduced is based on a standard industry classification and the final variable is based on a detailed codification that provides a classification for up to 9000 business operations. Companies are classified into industries based on business operations. These operations vary and include highly complex and high-tech companies, whose equity is made up of intangible value, tangible asset intensive companies, manufacturing and service companies and innovative and high technology companies.

Chapter 7 develops four corporate governance hypotheses. This research examines the influence on VDIC of remuneration to both the executive and the influence of dual roles in senior board positions. The next two variables examine the influence of cross directorships and the proportion of equity held by the executive. Chapter 8 presents the results of the full model that combines variables included in the focus on IC investment, financial measures of risk, industry membership and corporate governance mechanisms. This chapter examines the combined influence of these determinants on the level of IC disclosure. Chapter 9 is the summary of the entire project. It starts by surveying this research and comparing the results of the current research with the previous research based on UK data and on data from other countries. It then goes on to

discuss the implications of the results. This is followed by an overall conclusion based on the research objectives, a discussion of the limitations of this research and finally some further areas for research are suggested.

2 Literature Review

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2.1.0. Introduction

This chapter incorporates the literature review and the development of a VDF that determines existing mandatory regulations and their influence on the proposed ICF. The mandatory regulations are based on the UK legal framework. This chapter develops an ICF by defining SC, RC and HC based on various applied frameworks. The origination of the framework is examined and its development is chartered by examining the justifications for its varying applications. The literature review places focus on the theoretical implications of VDIC by examining empirical studies conducted within both general and IC disclosure studies. The TF is applied to determine how each of the company characteristics identified in the literature are developed into the respective hypotheses. The variables investigated are associated with size, growth, IC investment, risk, industry membership and corporate governance mechanisms. Size and growth are drawn into this research from the general disclosure literature and the latter four characteristics from the research objectives generated in section 1.1.2.

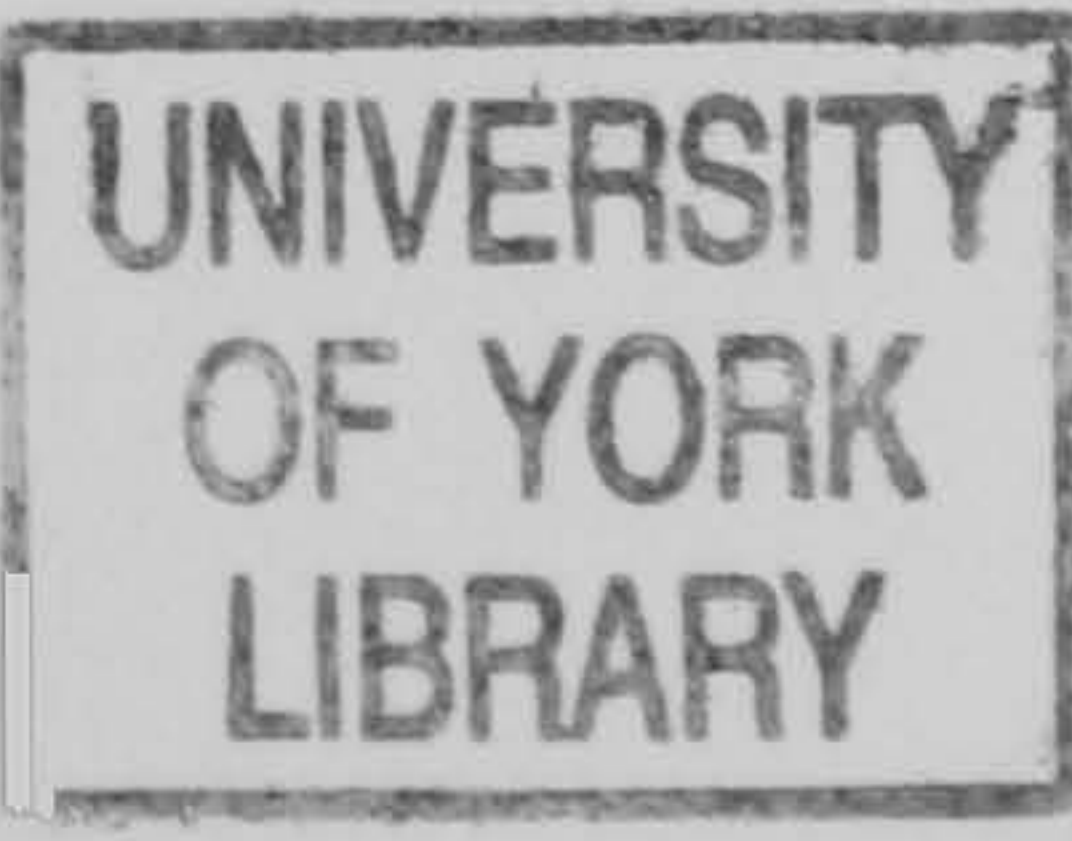
Table 2.1 presents the analytical framework for this research. This analytical framework combines the investment in IA, equity risk, industry membership and governance characteristics. By combining the RBV and signalling approaches to intangible disclosures the analytical framework illustrates on the vertical axis, the resource base of the firm as represented by a continuum, which at one extreme consists of explicit and easily replicable resources and at the other consists of tacit and very difficult to replicate intellectual and similar IA. On the horizontal axis, the signalling incentive is represented by a continuum, which at one extreme consists of basic non-technological activities, low risk equities, manufacturing companies and limited governance mechanisms likely to lead to minimum disclosure; at the other, complex technologically innovative activities, high equity risk, non-manufacturing companies and strong governance mechanisms likely to lead to full disclosure.

Table 2.1 forms the basis for assessing and developing testable hypotheses to explain the disclosure of IC. The interaction of investment in IC on disclosure is presented in Table 2.1. At lower levels of IC investment,

Table 2.1 Analytical Framework: Resources, IC investment activities, equity risk, industry and governance characteristics and disclosure: an analytical framework

	IC Investment	Risk	Industry	Transparency/ Governance structure
Organisational Resource Base	Low IC investment	Low	Basic technological activities	Limited
	High investment in IC	High	non-technological activities	High
Replicable	Quadrant 1	Quadrant 1	Quadrant 1	Quadrant 1
	Quadrant 2	Quadrant 2	Quadrant 2	Quadrant 2
	Low disclosure	Low disclosure	Low disclosure	Low disclosure
	Quadrant 4	Quadrant 4	Quadrant 4	Quadrant 4
Non-replicable	High disclosure	High disclosure	High disclosure	High disclosure
	Quadrant 3	Quadrant 3	Quadrant 3	Quadrant 3
	Moderate disclosure	Moderate disclosure	Moderate disclosure	Moderate disclosure
	Quadrant 4	Quadrant 4	Quadrant 4	Quadrant 4

Source: Analytical Framework



companies are expected to provide low VDIC as illustrated by quadrant 1; the resource base of the company is predominantly replicable. Quadrant 2, illustrates that a replicable asset base regardless of investment in IC may lead to low VDIC; however, as the IA resource base increases through IC investment, management may increase the level of IC disclosure in accordance with signalling theory as they communicate the existence of IA resources consistent with quadrant 3 and 4. High disclosure is expected in quadrant 3 where the high investment in IC is complemented by the existence of a significant amount of IA in the resource base. Table 2.1 illustrates that an increase in IC investment may be expected to result in VDIC as management reduce information asymmetry through signalling IA resources.

The interaction of risk on IC disclosure is presented by an analysis of tangible and intangible resources. Companies with firm specific assets that are not easily duplicated are likely to have higher market risk due to asymmetrical information associated with complexity of measurement and reporting of such IC. Firms with a majority of replicable assets as represented by quadrants 1 and 2 are expected to have lower levels of VDIC as these assets are observable. As the resource base of the firm becomes significantly more IA based, market risk is expected to increase resulting in higher levels of IC disclosure as represented by quadrants 3 and 4. Quadrant 3 illustrates that an increase in market risk may be expected to result in an increase in IC disclosure as management reduce information asymmetry through signalling IC information.

The analytical framework examines the relationship between industry membership and IC disclosure. Industries are classified into basic non-technological activities and complex technologically innovative activities. In Table 2.1, as illustrated by quadrant 1, basic industries have the lowest level of IC disclosure as they have the least IA in their resource base. However, those companies that do invest in IC are expected to provide additional IC disclosure as illustrated in quadrant 2. Technological companies are expected to have higher levels of “hidden value” and as such, they may disclose more IC relative to basic resource companies as illustrated by quadrants 3 and 4. Furthermore, management of these companies may be expected to signal the existence of IC particularly when they operate in complex sectors whilst conducting technologically innovative operations.

With respect to governance mechanisms, in quadrant 1, the asset base is explicit and governance mechanisms are weak, the lowest disclosure outcome is predicted. In quadrant 2, where the asset base is explicit and governance mechanisms are strong, disclosure is the same as in quadrant 1. Notwithstanding more effective governance mechanisms, the asset base does not dictate truthful disclosure, since the firm has no IC related to competitive advantage. In quadrant 4, where the asset base is tacit but the governance mechanisms are weak, disclosure will reach intermediate levels. In quadrant 3, where the asset base is tacit and the governance mechanisms are strong, disclosure will be at its highest, because although possessing similar asset bases as quadrant 4, firms governance mechanisms are likely to overcome managerial reticence about disclosure, induced for example by concerns about the competitive costs of the disclosures. Competitive advantage may be enhanced where the IC resource cannot be replicated due to barriers to imitation that may provide protection from proprietary costs. This competitive advantage is sustainable if the advantage resists erosion by competitor behaviour (Bharadwaj *et al.* 1993). Nevertheless, despite these potential benefits, companies do not always disclose IC; constraints to voluntary disclosure take different forms. Costs of competitive disadvantage, agency costs and costs of data collection and processing that may be higher for IC due to its intangible nature and inherent problems of identification, measurement and reporting. Moreover, as corporate governance mechanisms improve transparency, accountability may improve; as such, it may be that companies with substantial resources may be able to dedicate more resources to the controlling and monitoring function.

2.2.0. Voluntary Disclosure Framework

The setting of this research is placed within the context of a Voluntary Disclosure Framework (VDF). The identification and differentiation of voluntary IC attributes and mandatory IC attributes has not been established within the UK. International studies on VDIC have not conducted this review as IC has been generally unregulated and therefore all attributes have been considered voluntary by most studies. The emphasis of this section is to

conduct this appraisal; firstly to identify those IC attributes that are considered to be mandatory in terms of disclosure by a LSE UK listed company and secondly to provide a conceptual framework of the environment in which management make their decisions and formulate their disclosure policies. A review identified several regulations that may influence VDIC. Firstly, mandatory regulation of IC is almost non-existent; regulators and policy makers are aware of the complexity involved in identification, management and reporting thereof and are making strides in developing alternative means of reporting intangibles. This research identifies subsidiary names of a company as potentially conflicting with previous IC frameworks. Subsidiary company names were included under the external structure within Guthrie (2001) and Sveiby (1997) IC frameworks. Subsidiary company names should be disclosed in compliance with the Companies Act (1989), and are therefore excluded in the ICF as defined by this research. The existence of only one mandatory IC attribute provides evidence of the lack of regulation of IC within the UK context. Furthermore, it may be pure coincidence that disclosure of company names is mandatory as these disclosures are more likely aimed at providing the full identity of a company in compliance with the Companies Act (1989) rather than as a source of communicating the existence of IC.

This research therefore proposes the operational definition of a voluntary disclosure IC attribute as any IC information, narrative or non-narrative, financial or non-financial, illustrations, diagrams and graphical presentation contained in the annual reports. These should not be required to be disclosed by the Companies Act (1989), the European Community (EC) Directives (Fourth and Seventh) (1978 and 1983), the Statement of Standard Accounting Practice 13 (ASB 1989), the Financial Reporting Standards (FRS) (7, 10 and 11) (ASB 1994, 1997 and 1998) and the listing rules (Financial Services Authority 2000) issued by the LSE. This lack of IC regulation has been brought to the attention of regulators, who have taken steps to mitigate this limitation in financial reporting of IC by introducing various proposals. The Institute of Chartered Accountants in England and Wales (ICAEW 2003) published a document on “Information for Better Markets: New Reporting Models for Business” that considers the benefits of information communicated in words with respect to the valuation of intangibles in the modern economy.

Recently, the UK government through the Financial Reporting Council (FRC) proceeded with the proposed Operating and Financial Review (OFR) requirement for UK listed companies. Due to the narrative nature of IC attributes investors, analysts and academics favour increased accuracy in these reports and therefore welcome the requirement that directors are now expected to exercise the same level of care in relation to the OFR as is required in the financial statements. Although more persuasive rather than mandatory, Accounting and Standards Board (ASB) (2003) does recommend the reporting of IA not reflected in the balance sheet and on measures taken with respect to future performance. In addition, the OFR recommends additional voluntary intangible disclosures on corporate reputation, brands, IC, R&D, customer relationships, market position/dominance, HC policies and practice (Davison and Skerratt 2007). Although this legislation becomes effective on 1 April 2006, it reveals that regulators are aware of the increasing reliance by the market on narratives in disclosing IC. Reliance on the financial statements alone has become less informative as a measure of company potential largely due to the lack of disclosure of quantitative IC information therein; as such, markets are unable to accurately value the IC embedded in the equity of the company. External or market valuation has therefore been accepted as a satisfactory method of self-regulation. Generally, regulators have provided an environment in which market forces determine the value of IC and its potential growth opportunities.

This view however, is in contrast to the proactive stance taken by Strategic Management Accounting that emphasises the importance of companies to evaluate, appraise and measure their own IC (Tayles *et al.* 2002). This alternative view to IC management is supported by Mouritsen (1998), who suggests that IC valuation should be conducted internally as the company, relative to the market, has more insight into the internal capabilities (Tayles *et al.* 2002). Accountants on the other hand have proposed the market approach in which voluntary disclosures have been accepted as the best substitute; however, these disclosures have been fraught with drawbacks including misrepresentation and financial scandals. Particular risks may include inaccurate and inconsistent narratives leading to lack of confidence in the system. It appears that there has been little improvement in the legislation of IC

disclosure. Thus, the complexity of measuring, managing and reporting IC may be the underlying reason for the inability of regulators to identify and implement adequate IC disclosure requirements. Regulators have thus relied on the market to regulate companies. Most attempts at regulating IC have fallen short, comprising mainly voluntary requirements set out in various publications. Only recently, as an alternative to regulating quantitative disclosure, have regulators begun examining the potential of qualitative disclosures in conveying the IC information not provided in the financial statements. Therefore, the credibility of narrative disclosures has become important. Parameters with respect to ethical and accurate reporting have been proposed to ensure that directors maintain consistency between the narratives and the financial statements. These parameters must comply with a uniform and acceptable framework of IC categories, if the accuracy, the content and the comprehensiveness of VDIC is to be enhanced.

2.3.0. Intellectual Capital Framework (ICF)

The absence of an international framework on IC presents an additional problem that further compounds the complexity in identifying, measuring and reporting IC. This section examines the importance of the development of an ICF, the importance of defining IC attributes and classifying them. No globally accepted IC definition exists because being intangible, IC remains difficult to both measure and report. The development of the IC attribute definition and classification within academia and practice has been at a slow pace. The term IC was first advanced by Galbraith in 1969 (Bontis 1998 and Feiwel 1975, cited by Hudson 1993). As early as this, IC was considered to be more than just “intellect as pure intellect” but rather to incorporate a degree of “intellectual action”; as such, IC is not only a static IA per se, but also an ideological process, a means to an end. This section examines the development of ICF; the selected ICF is developed from various IC classifications; consideration is given to attributes that constitute mandatory disclosure as identified in the VDF, these are eliminated from this research. There are currently several classifications for identifying IC. The first was proposed by Brooking (1996, p.13) in which IC was described as the combined IA that enable the company to

function. The components of IC included market assets relating to customers and markets, human centred assets relating to skills embodied in employees of the organisation, IP relating to patents, copyrights and trademarks, and infrastructure assets relating to technologies, methodologies and processes that include management philosophy, corporate culture, information systems and financial relations. Further developments by Brooking and Motta (1996) classified IC into SC, RC and HC. Subsequent authors including Bontis (1996), Darling (1996), Edvinsson and Sullivan (1996), Saint-Onge (1996), Roos *et al.* (1997, p.30), Stewart (1997), Bontis (1998), Bontis *et al.* (2000), Sveiby (1997, p.12), Edvinsson and Malone (1997, p.52) and Dzinkowski (1999 and 2000) developed IC frameworks in various directions to suite their particular research and country of study. Several significant studies have taken place using the contemporary classification scheme for IA derived from Sveiby (1997, p.12) who classified IC into internal structures (organisational capital), external structures (customer/relational capital) and employee competences (human capital). A definition was proposed by Stewart (1997, p.x.) who defined IC as intellectual material “knowledge, information, intellectual property, experience” that can be put to use to create wealth. Edvinsson and Malone (1997, p.10) developed a definition encompassing only two of Stewart’s (1997, p.x) categories, these include IC related to SC and HC. Edvinsson and Malone (1997, p.10) identified the complex nature of IC by providing a metaphor in which the “roots” of the tree are compared to the IC of the company that determines the prospects for the future, further that the “roots” are invisible but form the basis for the value of the company. This intricacy has limited the identification of an appropriate measure, compounded by the lack of adequate regulations, reporting of IC has been inconsistent internationally.

Feiwal (1975, cited by Hudson 1993) and Stewart (1997) focus on IC as a process that creates wealth, rather than as a static resource. Both require action and application for the IC process to achieve its objectives. Stewart (1997) identifies four sources of IC including information relating to the knowledge resources of a company, IP, IC information that can be defined as knowledge and experience that can be used to create wealth. Stewart (1997, p.79, 105 and 142) definition of IC forms the basis of the definition of IC for this research. The majority of studies in the literature have applied the Sveiby

(1997) framework that is based on the Stewart (1997) framework. The areas identified by Stewart (1997) are further summarised into three IC categories comprising SC, encompassing IP, RC and HC in a subsequent study by Stewart (2001, p.13). This IC framework has been applied by Guthrie and Petty (2000), Guthrie (2001), Ch'ang and Yastreboff (2003), International Federation of Accountants (IFAC) (1998, p.7), the Australian Society of CPAs and the Society of Management Accountants of Canada (1999, p.14), Abeysekera (2001), Guthrie (2001) and Sveiby (1997). The emergence of these and other definitions has slowly enabled companies to begin identifying their IC attributes (Stewart 2001, p.314). Identification, has led to maintenance of IC particularly when such IC illustrates a sustained competitive advantage. Measurement of IC has remained elusive for both practitioners and academia due mainly to the intangible nature of IC resulting in little management or reporting thereof. Based on the various aforementioned country frameworks this research develops a UK ICF (Table 2.2.), that is consistent in classification (SC, RC and HC) with the original format (Brooking 1996) and the framework developed by Sveiby (1997).

Table 2.2 IC Framework

Internal Structural Capital SC (8)	External Relational Capital RC (8)	Human Capital HC (7)
1.Patents	9.Brands	17.Know-how
2.Copyrights	10.Customers	18.Training
3.Trademarks	11.Customer loyalty	19.Level of education
4.Management philosophy	12.Distribution channels	20.Vocational qualifications
5.Corporate culture	13.Business collaborations	21.Training and development
6.Management processes	14.Licensing agreements	22.Entrepreneurial spirit
7.Information systems	15.Favourable contracts	23.Innovativeness
8.Financial relations	16.Franchising agreements	

Source: Guthrie and Petty (2000)

This framework was based on the Intangible Asset Monitor that is one of several models reported by Marr and Adams (2004, p.20). The number of IC

attributes in each of these models varies, however the ICF is practical for this research and the categories of the ICF form part of three sub-groups of IA consistent with the convergence of frameworks into these three main categories SC, RC and HC (Stewart 1997, Sveiby 1997 and Lev 2001). IA and IC are viewed by Lev (2001) as interchangeable. He describes IA as non-physical resources of value derived from discounted future benefits generated by innovation, discovery, unique organisational designs and/or human resource practices. Lev (2001) uses the terms IA, knowledge assets and IC interchangeably, arguing that they differ only in their discipline of origin – IA for accountants, knowledge assets for economists and IC for managers and lawyers. Further confirmation of this basic structure of the framework is found in Edvinsson and Malone (1997) who see intangibles as the "hidden capabilities" of an organisation and consider them as deriving from two key sources - HC, structural or organisational capital and customer or relational capital (RC). A variety of IC frameworks are summarised in the research by Hayton (2005) in which four dimensions of IC are reported comprising market, human centered, intellectual property (IP) and infrastructure assets.

Two approaches to studying IC have emerged in the literature. These approaches have had an impact on the types of IC frameworks and definitions applied. The first approach is qualitative using mainly comparisons between countries and industries. The second approach, although comprising only a few studies, is empirical research, and examines the extent of IC disclosed and the significance of various independent variables. Qualitative studies have had less precise IC definitions as opposed to the empirical research that has tended to be more specific regarding the IC framework and the definition of the IC attributes. Nevertheless, a common theme to both approaches is the consistency in the overall classification of IC into SC, RC and HC. These classifications, although not identical, carry the same IC content. However, IC (such as patents, copyrights and trademarks) may be regulated by other rules that may require disclosure in different media, including the press, industry journals, labour union circulars and other company publications etc. These regulators may include financial services, copyright law, patent law or other and may lead to legal reporting obligations.

Abdolmohammadi (2005), Guthrie *et al.* (1999, 2004 and 2005), Bontis (2002), Edvinsson and Malone (1997), Edvinsson (2002), Stewart (1997) and (2001), Roos *et al.* (1998), O'Donnell and O'Regan (2000), Tseng and Goo (2005) and Andriessen (2004) developed IC frameworks similarly based on the groundbreaking work of Sveiby (1997). These further developments continue to convey IC standards as Human (HC), Organisational (SC) and Relational Resources (RC). The latest revised version of this framework presents IC as three categories comprising of internal (SC) (6), external (RC) (6) and human (HC) (5). Guthrie and Petty (2000) who proposed this classification suggest that IC should consist of RC pertaining to the competency level of customer and supplier relations, SC relating to the enterprise process competency and R&D activities, and HC comprising of human and organisational competence. Based on this discussion, SC is defined as the experience, the knowledge and the expertise that is embedded in the policies, processes and procedures of the company; these include IP, trade secrets, formulas and manuals. RC is defined as the knowledge and expertise that is embedded in the relationships between a company and its stakeholders in particular customers, suppliers, providers of finance and regulators. Additional considerations require relationships to be maintained on public issues such as reputation and social responsibility. HC is defined as the knowledge, experience and expertise of employees; it comprises several physiological factors that shape individuals' learning experiences and perceptions. These factors include genetic inheritance, education, experience and attitudes about life and business.

Within the ICF of this research, ICCA is defined as the SC, RC and HC incorporated in a company's policies and procedures that provide a competitive advantage over competitors who due to barriers to imitation may not apply or replicate such competitive advantage. Nevertheless, despite the many definitions, it appears that IC needs to be defined in context due to its complex nature. The lack of regulation has not led to a concise, concrete and positive definition of IC, rather it has resulted in the employment of lists as illustrated by Roos *et al.* (1998), Edvinsson and Malone (1997) and Sveiby (1997) and classifications to describe IC. As a result, this research refers to and concurs with the findings of Chatzkel (2002) who suggests that all definitions are valid and that it is up to the user to select the definition that works best to meet a

particular set of circumstances. This view is adopted by Marr and Chatzkel (2004, cited by Huang *et al.* 2007), who suggest that no more IC definitions are required rather, that the clarity of communication is critical. Huang *et al.* (2007) develop an a *priori* taxonomy in IC that provides a reference point for internal or external IC communication by developing a classification of IC derived from published research. This classification (Huang *et al.* 2007, p.4) is consistent in categories with the ICF of this research.

2.3.1. Structural Capital (SC)

This section discusses the various components of SC and the benefits of possession and signalling of such attributes in the organisation. Various prior studies have examined the extent of SC disclosure in the annual reports; this research reviews these results comparatively with respect to country studies and IC categories. SC refers to company procedures, frameworks and structures. SC includes in its first category patents, copyrights, proprietary process, methodologies, trademarks, trade secrets and other IP that may be purchased outright or developed internally through R&D activity. Some companies may disclose capitalised R&D in the form of IA on the balance sheet in compliance with mandatory regulations. These IA do not form part of the ICF for this research.

The management and reporting of IP is determined by the management philosophy that forms the second category under SC. The philosophy adopted by management may assist in directing the company, choosing projects and maintaining the strategic choices and may be influential in determining resources to be applied in IC investment. In conjunction with management philosophy, the next categories of SC, corporate culture, leadership and communication are components that facilitate a creative, directed and productive workplace. This suggestion was proposed by Abdolmohammadi (2005) in a longitudinal content analysis of 284 US companies in which the study supports the significance of a relationship between SC including IP and disclosure. SC attributes are considered the link that supports the inclusion of corporate governance mechanisms as independent variables and or as measures of management philosophy and corporate culture. Leadership is a unique HC

attribute that may be found in management structures. A dominant leader may have a profound effect on an organisation particularly as market perceptions of his influence may affect a company's market value (MV).

The fourth category, management processes includes expansion of company capacity, improvements in the business model, functional distribution and/or communication networks, effective quality management procedures and overall increases in efficiency. Efficiency measurements such as labour, capital, structural, speed of process, process quality and product/service quality can be applied in evaluating management processes. The fifth category, information systems, technological systems, web transactions, computer software and operating systems relate to the management of IC information. Networking systems, electronic data interchange and telecommunication infrastructure are also included under SC. The sixth and final categories are financial relations and include favourable financial relations and terms with all stakeholders. Further, best practice processes, supportive cultures and efficiency are terms associated with this group of attributes (Bontis 1998). A wide range of studies (Table 2.4) investigated IP disclosure in different settings with varying results. Guthrie *et al.* (1999), in Australia, who found some disclosure of IP; Bozzolan *et al.* (2003) in Italy found 30 per cent disclosure was related to SC; Goh and Lim (2004) in Malaysia found 36.6 per cent internal capital and in a comprehensive study, Vergauwen and Allem (2005) investigating the Netherlands, France and Germany found significant incidence of IP disclosure. In South Africa however, April *et al.* (2003) found the least management emphasis on the reporting of copyrights, patents and rights probably being due to the expectation that mining companies have few if any IP. Comprising mainly of internal capital, possession of SC is expected to lead to more efficiency, supportive cultures and established policies and procedures. However, different levels of SC disclosure are expected in different industries (April *et al.*, 2003) and different countries (Vergauwen and Allem, 2005).

2.3.2. Relational (Customer) Capital

Following the approach in 2.3.1 above this section examines the individual components of RC and then reviews prior studies on the disclosure of RC

attributes. RC consists of the knowledge of customer relations and marketing channels. Brands are instrumental in generating customer loyalty and in increasing and maintaining market share. Brands are thus included under RC due to their relation building characteristics with customers and their ability to influence customer-buying patterns. The second category consists of the customers themselves, new customers, customer lists, customer items, customer satisfaction, sales by segment or region, market shares, order book, long-term sales contracts and information regarding customer relations would all constitute voluntary disclosures of RC. These attributes are mainly associated with company sales and may be measurable as changes from year to year or in comparison with industry averages and competitors. Customer loyalty is the next category formed by customer retention, customer service, customer support and market share which are all concerned with management efforts in retaining and expanding the customer base. Distribution channels classified as the fourth category provide access to markets for goods and services. The next category, business collaborations incorporate all partnerships and joint ventures. Partnerships and joint ventures provide management with opportunities to work together with other entities in producing products or services that neither could produce individually. Licensing agreements, favourable contracts and franchising agreements form the sixth, seventh and eighth categories respectively. These generally provide specific rights to the company for the supply of services, goods, capital and labour including favourable contracts for the development of combined strategies.

A few studies identified RC as a significant disclosure attribute in some countries (Table 2.4). Brennan (2001) in Ireland, identified customers and business collaborations as the main IC attributes reported. Although only 11 companies from knowledge based industries were examined, the study did examine all categories of IC as such the result of RC being the most reported IC, may be more relevant than previous studies that examined only one category. In South Africa, April *et al.* (2003) found a similar reporting practice, with business collaborations and customers featuring amongst the most reported RC attributes. In a comprehensive Italian study, Bozzolan *et al.* (2003) identified RC as the most reported IC attributes. The limitation for this study was the small population of only 30 large listed companies as was the study in

Malaysia, in which Goh and Lim (2004) found further evidence, indicating that companies here report more RC than SC or HC attributes. The sample here was restricted to only 20 companies; nevertheless, there appears to be significant evidence that RC remains the single most reported IC category. Generally, RC is associated with increasing and maintaining market share. It may be expected for this reason that the reporting of RC is important for companies pursuing growth and expansion strategies.

2.3.3. Human Capital (HC)

The final IC category examines the level of disclosure of HC components, competence, skill and experience of employees. A high level of education in the work force, diversity of employees and relevant work experience enhance a company's prospects whilst ensuring higher labour productivity. HC attributes may take the form of diplomas or certificates obtained from recognised institutions, certification of work force characteristics such as productivity and or product or service quality by third party analysts and third party accreditation through various educational qualifications including the average number of degrees awarded to employees. Management may make annual report disclosures that illustrate procedures such as in-house training or external training courses being conducted to increase the level of expertise within its workforce. Other indicators may be the attainment of certain standards in terms of departmental or individual achievement, value added per employee and employee compensation.

The literature on HC has dominated single category studies, various HC attributes have been examined with mixed results being reported (Table 2.4). Differences have been attributed to terms of definitions and stage of country development. In an HC investigation, Subbarao and Zeghal (1997) analysed 120 annual reports of a sample of listed companies from the USA, Canada, Germany, UK, Japan and South Korea to compare HC disclosure. Using content analysis, frequency, and word count analysis they examined five broad categories of training, value added by employees, workforce diversity and social responsibility, employee relations and employee compensation. The results indicated that benefits and pensions were the most frequently disclosed

due mainly to the overlap with mandatory requirements whilst value added per employee was the least reported. Employees who had special contributions to the company were also featured. The comparative analysis disclosed differences in the information disclosed from country to country with US companies disclosing more profit sharing information than European companies, the number of people employed and employee compensation while very few disclosed such information in Asia. The results of this study are based on one category of IC, HC; furthermore, the sample size per country is limited to 20 companies. In addition, no account was taken for the effect of industry membership, or the effect of cross-cultural differences or differences in corporate governance or legal systems.

Further studies illustrate that not only are there differences between countries but that differences can also be found within industries. Following Subbarao and Zeghal (1997), Abeysekera and Guthrie (2005) selected 30 of the largest companies for content analysis of HC reporting practices in Sri Lanka. The method used in this study was similar to that of Guthrie *et al.* (1999). A frequency and line count was made, and the descriptive statistics tabled. The study was confined to HC indicators only. The study was limited to only 20 companies and only the largest suggesting that results may not be representative of all Sri Lanka listed companies. An examination was conducted on the disclosure patterns of HC reporting observed in the Sri Lankan sample, and a second comparison was made of the differences in disclosure patterns between Sri Lanka and Australia. It was found that companies with the largest market capitalisation tend to lead the way insofar as the voluntary reporting of IC is concerned. This conclusion may be biased; no small companies were included in the samples; differences in HC practices between Sri Lanka and Australia may be attributed to differences in corporate governance structures, management practices, industry norms and cultural traditions. Entrepreneurial spirit was the most frequently reported attribute of HC in Australia (Guthrie *et al.* 1999 and Guthrie and Petty 2000), as opposed to the featuring of employees in Sri Lanka. In contrast, entrepreneurial spirit was one of the least reported items in Sri Lanka. Work related knowledge was the second most important HC attribute in Australia, whereas in Sri Lanka value added by employees ranked second. Differences in the knowledge of the definitions and the terminology of

IC, the stage of economic development, existence of structures to identify, measure and report IC may contribute to these differences in results. A similar study was conducted on HC by Olsson (2001) who examined the annual reports of the 18 largest Swedish companies that were selected based on market capitalisation from the Swedish stock market. She developed a list of five elements to ascertain the level of HC: education and development, equality, recruitment, selection of employees and comments by executive officers about personnel. The study found that, in 1998, none of the 18 companies reported more than seven per cent of HC information as a proportion of total information in their annual reports. Furthermore, the information that was reported was found to be highly deficient in either the quality or the extent of the disclosure. In this study, results are again restricted to a small sample of only large companies and the analysis of only one category of HC. It may be important to analyse all the categories of IC simultaneously due to the inter-relatedness of SC, RC and HC. Different results have emerged in the literature as to which HC characteristics management favour to disclose. Abeysekera and Guthrie (2005) in Sri Lanka found value added by employees as a more frequently reported attribute in contrast to Subbarao and Zeghal (1997) who found it least reported. This study differed from those of Brennan (2001) and Olsson (2001) in terms of the representativeness of the sample size and the analytical rigour employed in reviewing the results. Olsson (2001) restricted the scope of the review to only certain parts of the annual report excluding key areas included by Abeysekera and Guthrie (2005). These studies have concentrated on one IC category, single sector/industry and results indicate generally a low IC reporting culture. Management may disclose IC by signalling their superior HC attributes such disclosures may be determined by the type of industry and may be channelled through selected sections of the annual report. Superior HC attributes may include management's ability to negotiate through political, social, industrial or economic pressures. The ability to foresee and adapt to the changing environment may be measured through successful innovations, innovation in production, service or process that results in new software, patents, ventures or developments.

The results on disclosure of IC have been mixed with some authors reporting a higher level of disclosure of SC, other authors reporting on HC and

still others on RC. The results have been generally country and industry specific. The number of HC specific studies is large in comparison to other categories indicating the importance of the human element in organisational dynamics. However, various definitions may render results incomparable particularly at the national level as developing and developed economies place different emphasis on different IC attributes within the specified IC categories. Section 2.2.0 established a VDF and section 2.3.0 presented the ICF in which each of the classifications of HC, SC and RC are established for the UK context. The next section combines the RBV approach and signalling theory in addition to agency theory and proprietary cost hypothesis in developing a theoretical framework for this research.

2.4.0. Theoretical Framework

Various studies in the IC field have been reviewed to determine the suitability of the adapted ICF and to examine the methodology, the theoretical perspectives and the results of the studies. The next section 2.5.0 develops the hypotheses and models that are subjected to the empirical tests. This section summarises the theories applied in this research based on predicted management behaviour. The theoretical foundations for this behaviour are based on agency theory, signalling theory, RBV and proprietary costs hypothesis.

The literature has identified five motivational factors as driving management's disclosure decisions and five factors that may constrain disclosure (Graham *et al.* 2005). The first is explained by Diamond and Verrecchia (1991), who suggest that voluntary disclosure reduces information asymmetry between uninformed and informed investors and thus increases the liquidity of the equity in the market, both by reducing information risk and the inherent risk of the security. The second factor relates to the availability of information to analysts; Lang and Lundholm (1996) argue that not all management information is revealed and therefore analysts may invest in information collection costs, however as voluntary disclosure lowers the cost of information acquisition management may be motivated to increase the amount of information available to analysts.

The third motivational factor examines management performance. Healey and Palepu (2001) suggest that the risk of replacement due to poor share price performance encourages management to apply disclosure to reduce the likelihood of undervaluation and the need to explain poor performance. Moreover, Trueman (1986) argues that when management performance is above average, management may have an incentive to signal this performance. The fifth motivational factor emanates from the limitations imposed by mandatory disclosures that ignore non-financial indicators of future earnings (Graham *et al.* 2005). Management may therefore be motivated to disclose that which has been omitted by mandatory disclosure.

On the other hand, management may be restricted in their voluntary disclosure policy; as such, the first constraint identified by this research relates to management's reservations on setting a precedent that may not be sustainable. Verrecchia (2001) refers to this constraint as the commitment cost of increasing voluntary disclosure. The second constraint relates to the threat of litigation that may induce management not to disclose IC (Skinner 1997) and that can potentially reduce management's incentives to provide forward-looking information which if materially misstated may result in litigation costs. This limitation arises from the inherent uncertainty of IC and the resultant share price discounting that may take place if disclosures are not credible. The third constraint explains why management do not provide full disclosure as it is understood that some disclosures may jeopardise the company's competitive position in the product market (Verrecchia 2001). This limitation is therefore associated with proprietary costs.

The fourth constraint is associated with agency costs and asymmetric information that may result in reduced disclosure as management attempt to perpetuate and entrench their positions (Berle and Means 1934). Finally, the fifth constraint is motivated by management's need to reduce political costs. Watts and Zimmerman (1978 and 1986) suggest that political costs reduce voluntary disclosure as management shy away from undue attention from regulators. Given the aforementioned motivations and limitations of voluntary disclosure identified in the literature, this research examines the theoretical basis applied in these potential explanations. In terms of the theoretical

approach, this research refers to Abeysekera (2006) who outlines the development of a theoretical framework underlying IC disclosure.

Theories that have been considered include legitimacy and stakeholder (Guthrie *et al.* 2004, Abeysekera and Guthrie 2005), signalling (Bozzolan *et al.* 2003 and Garcia and Martinez 2005), resource based (Barney 2001), agency (Bozzolan *et al.* 2003 and Garcia and Martinez 2005) and information asymmetry (Amir and Lev 1996). Although the IC literature illustrates the application of various theoretical approaches, the general disclosure literature has indicated an overall close association with agency and signalling theories.

The number of different theoretical approaches in prior studies may indicate that a consensus has not been achieved. It is expected nevertheless that various conflicting forces influence management who are contractually bound as agents of the company but who may not necessarily behave as such at all times. This section examines the theoretical underpinnings of the three potential disclosure outcomes maximum, partial and minimal disclosure and appraises the role played by voluntary disclosure at the corporate level. This research proposes that companies' pursuit of a maximum disclosure policy may be explained by signalling theory. A minimal or no disclosure policy may be explained by proprietary cost theory. Where mitigating factors exist however, a partial disclosure outcome may result from barriers to imitation limiting the perceived potential disclosure costs.

This research adopts a positivist approach by developing several hypotheses based on selected theories to explain observed management behaviour. This approach consists of the undistorted recording of observations obtained through efficiency-driven methods of investigation and the use of precise terminologies and classifications in the documentary process (Chia 2002, p.7). Observational rigour is applied using systems of cross-referencing that provide the necessary form of "quality assurance" in this process of knowledge production. Thus, positivism represents one of the more recent attempts at synthesizing rationalism and empiricism. It provides the most widely held epistemological position within the natural and social sciences, as it combines logic, rationality with empirical observation (Chia 2002, p.7).

This research extends positive accounting theory by observing and examining the influence of investment in IC, financial measures of risk,

industry membership and corporate governance variables in more detail. The model for this research is based on the premises of positive accounting theory (Watts and Zimmerman 1978 and 1986). Positive accounting theory is the branch of accounting theory that attempts to explain management behaviour and accounting policy choice decisions by considering the economic consequences of particular decisions, with regard to incentive and reward schemes put in place to motivate and reward them (Watts and Zimmerman 1986). The theory utilises economics, in particular agency theory (Jensen and Meckling 1976) to explain and predict observed behaviour. Explanations of accounting behaviour are important, as any changes of accounting practice depend on existing political and economic forces (Gould 1977).

The research model in Table 2.3 summarises the theoretical approach applied by this research. The first theoretical approach proposed by this research is agency theory that may explain management behaviour when objectives are not aligned with those of shareholders. Management may limit disclosure in a bid to protect and sustain their positions. Agency costs are expected to be high; disclosure is limited.

Table 2.3 The Research Model

Disclosure Outcomes	Voluntary Disclosure framework (VDF)	Theoretical framework (TF)
1	<i>Minimum disclosure</i> (high disclosure cost)	Agency Theory
2	<i>Partial disclosure</i> (high disclosure cost mitigated by barriers to imitation)	Proprietary Cost Hypothesis
3	<i>Maximum disclosure</i> (low disclosure costs)	Signalling Theory
4	<i>Maximum disclosure</i> (low disclosure costs)	Resource Based View

Source: The Research Model

The second approach predicts management behaviour in the presence of proprietary costs that generally lead to minimal or no disclosure however, the existence of mitigating circumstances such as barriers to imitation that may deter the transfer of information to competitors, may lead to management's partial disclosure of IC attributes. These barriers to imitation may render

otherwise costly disclosures, less costly resulting in partial disclosure depending on management's ability to accurately quantify related benefits and costs. Nevertheless, the lack of mitigating factors renders disclosure costly and may lead to little or no disclosure. Such behaviour may be explained by the competitive costs hypothesis and the proprietary cost hypothesis.

The third theoretical approach is signalling theory in which management disclose superior performance because of the existence of inimitable assets that generate competitive advantage. This signalling may be attributed to the investment in IC and is consistent with the RBV approach that forms the fourth theoretical approach. Management decide on whether IC attributes disclosed may be associated with disclosure costs that take the form of proprietary costs. Disclosure studies have regarded agency and signalling theoretical approaches as complementary. In exploring whether these two theories are consistent, Morris (1987, p.52) found that the sufficient conditions for signalling theory are consistent with those of agency theory. However a necessary condition for signalling, information asymmetry, is not shared by agency theory, although implied, as such, the predictions of accounting choices can at least be improved by adding together the predictions from each theory. The fourth approach combines the RBV with signalling of competitive advantage due to the existence of potentially valuable assets that are difficult to replicate. Such inimitable assets may be disclosed in a bid to signal unique processes, products or services.

Mandatory disclosures are generally ritualistic disclosures as management have no influence in the disclosure decision, but merely comply with accounting regulations. Voluntary disclosures on the other hand, are motivated by the theoretical foundations derived from economic theory, the major assumption of which is that management weigh the costs and benefits of their actions. Only once management decide that benefits outweigh costs, is the decision to disclose made. Generally, costs may include information collection and processing, litigation, political and competitive disadvantage costs (Benston 1986). Benefits include a reduction in the cost of capital and in information asymmetry because of reduced transaction costs, greater equity liquidity due to reduced asymmetrical information, less uncertainty due to more information availability, a mitigation of the adverse selection problems,

improved stock performance and a higher stock price correlation with future earnings (Benston 1986). Management therefore needs to have in place proper corporate governance procedures and processes capable of accurately compiling the data and assessing whether the incentives to disclose more information to investors, stakeholders, employees, customers and regulators outweighs the drawbacks.

2.4.1. Agency Theory

Agency theory illustrates that the separation of ownership and control in companies results in conflicts of interest between a company's management and its shareholders. Several potential areas of conflict between management and shareholders have been identified including insufficient effort, extravagant investments, entrenchment strategies and self-dealing (Economist 2006). When such conflicts emerge, agency theory suggests that management tends to pursue their own interests over those of shareholders, resulting in conflicts of interest. Costs are incurred in monitoring these agents. Nevertheless, given that these costs reduce their compensation, management has an incentive to keep them low. Jensen and Meckling (1976) categorise this cost into monitoring, expenses incurred by the principal to limit aberrant activities of the agent; bonding costs, expense incurred to ensure that the agent does not undertake actions that are not in the principals' interests and residual loss, due to sub-optimisation by the agent of the welfare-maximisation objective (Barako *et al.* 2006, p.110). Since VDIC may be one way in which management activity can be monitored, management are encouraged to disclose IC information voluntarily. Voluntary disclosure incentives theoretically arise from information asymmetry between management and shareholders. Information asymmetry leads to adverse selection and moral hazard problems for investors and signalling incentives for management to attempt to mitigate the information problems with investors (Healy and Palepu 1993). Where shareholders cannot observe the behaviour of management, the problem of moral hazard arises. Adverse selection arises because of hidden information particularly information concerning the characteristics of management i.e. as most shareholders are unaware of management motivations and/or interests. These differences are normally

reflected in share prices, but a problem arises if the investor cannot determine whether management behaviour may increase the quality of earnings, the growth rate and profitability. Moreover, lower returns may result in a replacement of management by shareholders.

Agency theory maintains that the equity market is not perfect, as such; management can enrich themselves at the expense of shareholders without being displaced (Berle and Means 1934). Management would be expected to disclose positive information and conceal negative information about the company in attempting to avoid dismissal or a reduction in incentive contracts. Highlighting positive information and concealing negative information may also help maintain shareholder confidence in the company's management; otherwise, shareholders may sell the company's stock, causing the stock price to fall. Falling stock prices then make the company a potential takeover target, in which case, the company's management may be replaced. Moreover, concealing negative information gives management time to turn-around failing projects. In short, the constant pressure to increase shareholder value and the fear of being replaced motivates management to develop communication strategies aimed at shaping shareholder impressions about their managerial performance (Cheney and Carroll 1997). The adverse selection problem for shareholders is that they may not know the most relevant information or the better quality of data, as a representation of the company's activities. Thus, when management interests and shareholder interests diverge, management can exploit their informational advantages to pursue their own self-interests. Agency theory fits well within this research model. Agency theory has been associated with explaining management behaviour in the majority of disclosure studies.

2.4.2. Proprietary Costs Hypothesis

This section discusses the components of proprietary costs and non-proprietary costs and the resultant limitations placed in signalling IC attributes. Proprietary costs arise when information is revealed that potentially damages the company if it results in increased competition and or government regulation (Gray *et al.* 1995). Competitive disadvantage results from competitive costs that are addressed in a recent study by Guo *et al.* (2004) who analyse the effects of

increased voluntary disclosure by biotechnology firms. This industry is highly competitive and information on R&D, clinical trials, product pipelines, etc. is considered sensitive. Increased disclosure would result in competitive costs. These costs result from a disadvantage in the product market. The harmful effect of these competitive costs has also a major impact on the equity market as it reduces 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).

The research model in Table 2.3 further illustrates that within the VDF IC attributes may or may not incur proprietary costs. The identification and measurement of these proprietary costs is complex, being forecasts of costs and intangible in nature, it is necessary for management to have appropriate corporate governance mechanisms in place to assist in the coalition of accurate information for these estimates. These governance characteristics may promote transparency and accountability in management reporting practices. Higher returns may accrue to disclosing companies and lower returns to non-disclosing companies. These returns provide greater incentives to disclose IC rather than to limit VDIC due to proprietary costs. This continued trade off results in full disclosure equilibrium as reported by Grossman (1981) and Milgrom (1981) who argue that it is in management's interest to disclose all IC in order to signal better performance. In contrast, Foster (1986, Chaps. 1 and 2), suggests that accounting and reporting are influenced by a diverse and complex set of supply and demand forces. As indicated in section 1.1.0., employees, investors, customers and regulations require IC information disclosures, however information collection and processing costs, litigation costs, and proprietary (i.e., competitive disadvantage) and political costs (Gray *et al.* 1995) may result in only partial disclosure. 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 imitation the more likely management are to disclose IC attributes.

Lack of IC disclosure may lead to markets assuming the worst-case scenario in which full discounting may theoretically take place. Thus, the larger the proprietary cost, the greater the decrease in market share price and the greater the incentive not to disclose (Grossman 1981 and Milgrom 1981). Nevertheless, where investors are uncertain about what managers know partial disclosure policies are possible (Verrecchia 1983, Dye 1986 and Jung and Kwon 1988). Richardson (2001) looked further at the cost of disclosure and concluded that it is a function of information uncertainty. In this model, Richardson (2001) suggests that as information uncertainty decreases managers disclose more, because investors discount non-disclosure as a negative signal. However, beyond a certain point, disclosure costs due to competitive losses outweigh the discounting by investors. Thus companies may disclose some of their inside information when they expect to be penalised by investors relying on existing, more incomplete information. Proprietary costs may be inversely associated with high levels of IC disclosure; however, the existence of barriers to imitation for competitors provides an advantage to companies. Companies that estimate that they do not have sufficient protection from loss of competitive advantage through IC disclosure are not expected to disclose IC.

2.4.3. Signalling Theory

Within the research model, (Table 2.3) signalling theory explains the third theoretical approach that examines management's disclosure of IC and ICCA attributes. This approach examines signalling as a mechanism for explaining the disclosure of good news (Spence 1973) as represented by the disclosure of IC attributes. Although signalling initially developed in the labour markets, the process of signalling may be used in voluntary disclosure to reduce information asymmetry between management and investors. Information asymmetry may produce the problem of adverse selection (Akerlof 1970) however, management apply disclosure to indicate the underlying reality and to influence stakeholders. Potentially only performing companies may be expected to apply this mechanism, as the market is likely to punish any wrong signals (Morris 1987). Thus, companies with serious agency and political problems are likely to spend more resources on contracting and monitoring.

Signalling mechanisms improve the allocation of resources ensuring that companies that are more efficient receive more capital (Inchausti 1997). The RBV examines the nature of the company's resources; those firms with inimitable intangible resources may signal their existence to reveal the company's competitive advantage within the market. This IC relates to growth opportunities, risk and cash flows. Management of such companies signal their superior capabilities in order to differentiate themselves from companies without such a competitive advantage. The content of these disclosures are necessarily credible, as the markets penalise any inaccurate disclosures. The restriction of mandatory regulation in the UK to only the movements of capitalised development expenditure, IA and goodwill provides considerable discretion for companies to reveal or not to reveal their competitive advantage. IC intensive companies may prefer such a regulatory environment that enables additional disclosures to explain the difference between the book value of the company and the market price. Signalling provides the markets with the IC information. This information enables the correct valuation of equity. Signalling as a theoretical approach fits well with the research model in Table 2.2.

2.4.4. Resource Based View of the Firm (RBV)

The fourth approach, the RBV, bases its argument on the existence of potentially valuable assets that are difficult to replicate (Table 2.2). The applicability of this approach is based on the unique resources that IC provides a company. The RBV highlights the competitive advantage of companies as based in their unique constellation of resources, tangible capital, HC and organisational processes (Barney 1991). The resources that have been found to be especially valuable are those that are rare, durable, inimitable, and non-tradable (Barney 1991 and Dierickx and Cool 1989). These resources include SC, RC and HC. SC is generated mainly by unique R&D investment, RC by unique relations with customers and stakeholders and HC by a skilled, experienced and innovative workforce.

The market is expected to respond, more so, to new research than to the development of existing products, processes and services. Performance

measurement of R&D and unique product and service development activities is gaining increased importance because the effectiveness and efficiency of these activities not only determine a company's competitive advantage, but its very survival. In an environment where it is difficult to replicate IC, management may voluntarily disclose IC to illustrate their competitive edge and restrict voluntary disclosure in areas where no competitive advantage exists. The reasons for management behaving in this way is made possible on the one hand, in a market where barriers to imitation are high; duplication is restricted; successful projects may signal growth and VDIC may positively influence shareholder wealth maximisation. Where barriers to imitation are lower, the duplication of new technologies may be commonplace. However, where barriers to imitation may be higher IC resources may be protected. The RBV provides a framework for examining the effectiveness of these barriers to imitation by determining the level of IC disclosure in particular for firms with higher levels of IA resources.

2.4.5. Summary of IC Studies

The majority of IC research authors (Table 2.4.) have concluded that national setting bodies and regulators should develop an accounting framework to account for those IC attributes that are not regulated. The lack of regulation leads to an uncertainty regarding all issues surrounding IC, increase in high risk/reward opportunities and misallocation of resources by investors based on inaccurate forecasts by analysts. To understand the motivation behind certain choices and decisions, the lack of definition, description and details of characteristics associated with each IC attribute is the first major deficiency in the regulatory environment. The ASB and Financial Reporting Council (FRC) have been consulted; however, the lack of research in the area of study has produced no acceptable alternative. Initial measurement approaches have failed to achieve unanimity and harmonious acceptance internationally. The narratives and statements in annual reports have attracted investors' interests; being qualitative, they offer an alternative to the more conservative financial statement and are therefore an important source of management disclosure.

Table 2.4 Summary of Studies on the IC Framework

Author (Year) Country	Method	Sample size	Type of disclosure / (theory) tested/ (applied)	IC Category tested	Extent of Disclosure	Main IC attributes reported
Subbarao and Zeghal, (1997) Europe, US, Asia	Content analysis	120 companies	Voluntary and mandatory	Human resources	Low	Benefits and pensions, employees, information on profit sharing
Guthrie <i>et al.</i> (1999) Australia	Content analysis	20 largest companies	Voluntary	HC, SC and RC	HC 30%, RC 40% and SC 30%	HC, technology, work related knowledge, IP rights, organisational and workplace structure
Brennan (2001) Ireland	Content analysis	11 knowledge based companies (1997-99)	Voluntary	HC, SC and RC (24 elements Sveiby 1997)	Low	Customers and business collaborations
Guthrie and Petty (2000) Australia	Content Analysis (1998) (2 researchers)	20 listed (19 largest, 1 best practice)	Voluntary	HC, SC and RC (24 elements Sveiby 1997)		
Olsson (2001) Sweden	Content analysis, interviews	18 largest Swedish companies	Voluntary	HC (5 HC attributes)	Very low < 7%	None significant
April <i>et al.</i> (2003) South Africa	Content analysis, questionnaires, interviews	20 largest companies	Voluntary	HC, SC and RC (24 elements from Sveiby 1997 and Guthrie and Petty 2000)	Low	Business collaborations, work-related staff competencies, management processes, customers and brands

Table 2.4 Summary of Studies on the IC Framework (cont)

Author (Year) Country	Method	Sample size	Type of disclosure / (theory) tested/ (applied)	IC Category tested	Extent of Disclosure	Main IC attributes reported
Bontis (2003) Canada	Content analysis (electronic word search)	10000 listed companies	Voluntary	HC, CS & RC (39 IC terms identified from the literature)	Very Low (68/10000)	None significant
Bozzolan <i>et al.</i> (2003) Italy	Content and OLS regression analysis, stratified sampling	30 Listed Companies from the Italian Stock Exchange (2001)	Voluntary	Agency and signalling theory	Disclosure index of IC attributes derived from Guthrie and Petty (2000)	Positive significant variables confirmed: Size (sales); industry (high tech/profile)
Bozzolan <i>et al.</i> (2003) Italy	Stratified sampling, content and regression analysis	30 larges companies	Voluntary	HC, SC and RC (22 elements modified from Guthrie and Petty 2000)	Average 51%	49 per cent is related to RC, 30 per cent is related to SC and the remaining 21 per cent concerns HC
Goh and Lim (2004) Malaysia	Content analysis, questionnaires and interviews	Top 20 profit making public listed companies	Voluntary	HC, SC and RC (24 elements from Sveiby 1997 and Guthrie and Petty 2000)	Above average 61 per cent	41per cent RC, 36.6 per cent SC, 21.9 employee competencies, work-related competencies, work-related knowledge, infrastructure assets and information systems

Table 2.4 Summary of Studies on the IC Framework (cont)

Author (Year) Country	Method	Sample size	Type of disclosure / (theory) tested/ (applied)	IC Category tested	Extent of Disclosure	Main IC attributes reported
Abeysekera and Guthrie (2005) Sri-Lanka, Developing economy	Content analysis and cross-sectional over a 2 year term (1998-99)	30 largest companies from the Colombo exchange	Voluntary, political economy of accounting theory	IC, HC 45 items, 17 sub- categories	Low - comparative study, Overall increase in all categories except Internal capital	Australia: - Entrepreneurial spirit, work related knowledge Sri-Lanka: - Employees, value added by employees ,Brand building, corporate image, employee relations, value added by employees and training programmes
Vergauwen and Allem (2005) Netherlands, France and Germany	Content analysis	685 companies	Voluntary	IC (38 items modified from Bontis 2003)	Weak increase between 2000 and 2001 French>Germany>Dutch in order of average disclosure numbers	Information systems, IP, economic value added
Abdolmohammadi (2005) USA	Content analysis, longitudinal investigation (1993-1997)	284 Fortune 500 corporate annual reports	General disclosure (Cost/benefit theory)	IC and market capitalisation	Significant and positive association between disclosure and market capitalisation, increase in brand and proprietary processes, industry differences	Old economy (traditional tangible asset based companies) - Partnership and brands, new economy (high-tec R&D companies) - IP and information technology

Table 2.4 Summary of Studies on the IC Framework (cont)

Author (Year) Country	Method	Sample size	Type of disclosure / (theory) tested/ (applied)	IC Category tested	Extent of Disclosure	Main IC attributes reported
Garcia-Meca <i>et al.</i> (2005) Spain	Voluntary disclosure in presentations to analysts	257 Madrid Stock Exchange Companies	Univariate analysis and OLS regressions	Agency and political costs, signalling theory	Disclosure index ex. Bukh <i>et al.</i> (2001)	Positive significant variables confirmed: Size, market value book value (MBV) and multiple listing status
Vandemaele <i>et al.</i> (2005) The Netherlands, Sweden and UK	Content analysis, longitudinal analysis (1998-2002)	Dutch, Swedish and British Companies	Comparative study	IC disclosure	Swedish companies generally disclose more, trend slowed in 2002 due to convergence in disclosure practices	

IC studies conducted by Bozzolan *et al.* (2003), Garcia-Meca *et al.* (2005) and Williams (2001) provide some statistically tested independent variables that have been confirmed as associated with disclosure, turnover, multiple listing, gearing and membership of a technologically innovative industry. The frequency of reporting the different IC indicators compared poorly between most studies. The common element in most studies was that the samples selected consisted of the largest companies, generally from single industries as was the case with April *et al.* (2003) who selected the mining industry in South Africa. Goh and Lim (2004) confirm the trend of external capital being the most reported IC element, and that qualitative disclosures as opposed to quantitative disclosures form the content of IC attributes disclosed. Guthrie *et al.* (1999) found entrepreneurial spirit to be the most frequently reported, followed by customers and management processes. In contrast, Brennan (2001) found very few references to employees and entrepreneurial spirit but found customers to rank highly along with business collaborations.

As IC is developing constantly, the literature indicates that subsequent studies illustrate a growing awareness and understanding by companies of IC. One such study, conducted by Abeysekera and Guthrie (2005) in a longitudinal analysis indicates an improvement in IC disclosure levels. These varying disclosure levels have been attributed to the difference in market capitalisation between countries because of the different sizes of listed companies. Nevertheless, compounding the size effect, the sample of Guthrie *et al.* (1999) was taken (with one exception) from the top end (by market capitalisation) of Australian listed companies. A further difference is that Guthrie *et al.* (1999) studied six industry groups, whereas Brennan (2001) studied 11 companies from one industry. Goh and Lim (2004) study included banks, whereas most other studies did not include any financial companies. Certainly, differences exist between developed and developing nations in terms of the content and extent of disclosure, the various categories of IC indicators and the definitions of individual attributes disclosed.

As no study has yet examined a large sample on IC disclosure, this research will increase the size of the sample relative to prior studies from an average 30 to 439 companies. In comparison, prior studies tended to concentrate mainly on one or another industry i.e. mining or technological.

Moreover, IC attributes investigated tended to fall into single IC categories mainly HC. This research therefore examines a larger sample of companies covering a large spectrum of industries. It appears that all countries require a recognised ICF, as the extent of disclosure remains low. In addition, as long as certain IC is unrecognised under IAS 36 and IAS 38 (International Accounting Standards Committee (IASC) 1998) and other regulations, an international framework may not be easily achieved. This research groups all similar descriptive examples of attributes into categories of HC, SC and RC. In this way, this ICF may bring comparability to prior, current and future studies.

Few studies on voluntary disclosure are conducted on a longitudinal basis. One such study, Williams (2001) found evidence that during some years, the listing status, the extent of gearing and the industry membership influenced the amount of IC disclosure provided by a company. Williams (2001) investigated the disclosure practices in the annual reports of 31 Financial Times Securities and Equities (FTSE) 100 listed companies from 1996-2000 and the relationship between IC performance and the extent of IC disclosure (Table 2.4). The results vary significantly between the years; however generally, where IC performance is too high the amount of disclosure is reduced. This negative association may support the suggestion that firms reduce IC disclosures when performance reaches a threshold level for fear of competitive advantage being lost. This result reiterates the suggestion that competitive pressures may result in management reducing IC disclosures. The possibilities of voluntary disclosure levels changing from year to year in response to internal and external pressures may support the view for no regulation.

Bontis (2003) in an IC study on 10,000 companies in Canadian annual reports determined the level of IC disclosure by applying content analysis to the disclosure of terminology within annual reports (Table 2.4). Bontis (2003) examined the extent to which Canadian corporations publicly document the presence (or importance) of IC, no significant evidence was found to indicate an increase in IC disclosure. Seventy-four counts of IC disclosure were evident across a population of 10 000 items of disclosure. The term “intellectual capital” was disclosed in only “5” annual reports. These companies represented a wide range of industries and some were not necessarily knowledge-based (e.g., petroleum and natural gas extraction). Only a small proportion of

Canadian companies even used IC terminology in their annual reports. Bontis (2003) argued that the use of the IC language is an important pre-requisite to developing IC statements and concluded that although IC has a very strong impact on the drivers of future earnings; it was found that it was largely ignored in financial reporting. Although Bontis (2003) presents no TF, the study illustrates in general terms the lack of disclosure throughout a multitude of companies.

Guthrie *et al.* (1999) and Guthrie and Petty (2000) in content analysis studies investigated in Australian companies found that IC was largely ignored in financial reporting. Guthrie *et al.* (1999) conducted a frequency count in their content analysis study of 19 large Australian companies' annual reports (Table 2.4). The extent of IC reporting was assessed using the 24 IC indicators of Sveiby (1997). This study was a significant improvement in the field, basing its foundations on an IC framework and following an established research methodology. Guthrie *et al.* (1999) found that the key components of IC were not reported within a consistent framework when reported at all. The main areas of IC reporting focused on human resources, technology and IP rights, organisational structure and workplace structure. Overall, it was concluded that there was no established and mutually agreed ICF either for Australian companies or for the accounting profession. Further, despite a general consciousness about the importance of IC and the role it assumes in ensuring long-term organisational success, few enterprises appeared to have adopted a proactive stance in attempting to measure and externally report this type of information. This was among the first IC studies published, although no TF was applied, the study was able to illustrate in general terms the lack of disclosure throughout these 19 companies. Although results of Guthrie *et al.* (1999) showed a marked improvement on those of Bontis (1998), they remain qualitative as opposed to quantitative; note too that the sample selected in this investigation is relatively small and appears to be limited in scope as it only concentrates on large companies.

Brennan (2001) replicated Guthrie *et al.*'s (1999) study for Ireland. The sample of 11 Irish listed companies chosen for further study in this research comprised only knowledge-based companies, i.e. technology and HC orientated companies (Table 2.4). Such companies fall into an industrial sector (Hackstone

and Milne 1996, Robb *et al.* 2001 and Bozzolan *et al.* 2003) that is significantly associated with relatively more voluntarily disclosure of IC than others. Brennan (2001) concluded that there were very few references to employees and entrepreneurial spirit whereas customers ranked highly along with business collaborations, indicating that even in these highly technologically innovative sectors the incidence of IC reporting remains low.

An additional industry specific study was conducted by April *et al.* (2003) who applied a research methodology used originally by Guthrie *et al.* (1999) and subsequently used by Brennan (2001). April *et al.* (2003) combined content analysis of company annual reports with questionnaires and interviews with senior individuals in South African mining companies. Sentences were identified as the coding unit under content analysis and the method applied followed that of Guthrie *et al.* (1999). The 20 largest South African listed companies by market capitalisation (90 per cent were mining companies) were selected for analysis (Table 2.4).

As size has been positively and significantly associated with mandatory and voluntary disclosure (Firth 1979, Gray and Roberts 1989 and Camfferman and Cooke 2002), a selection of larger companies may be expected to have higher levels of IC disclosure. Findings at the individual attribute level indicate that the top 20 companies place the most emphasis on the reporting of business collaborations, work-related staff competencies, management processes, customers and brands. Companies placed least emphasis on the reporting of copyrights, patents, franchising agreements, licensing agreements and customer loyalty. The content analysis indicated that South African mining companies generally have a low awareness of their IC assets, or do not see the need to report on them. These findings have helped identify the need for IC development in particular, the need to provide a framework for policy makers, regulators, academics and practitioners. The lack of an established and generally accepted framework for IC reporting was again the reason given for the low results obtained in this study. These companies clearly value IC, but have some way to go in implementing appropriate systems and structures to manage IC meaningfully.

The period of single industry investigations was brought to an end by an investigation on Italian companies by Bozzolan *et al.* (2003) who identified

considerable differences for IC disclosed in annual reports belonging to high- and low- profile industries. Bozzolan *et al.* (2003) carried out one of the first empirical studies on VDIC. The authors studied a stratified sample of 30 organisations chosen from the non-financial companies listed on the Italian Stock Exchange as at 31 December 2001 (Table 2.4). This sample size was an improvement on prior comparative studies but remained small for empirical studies given the number of independent variables studied. The complete list consisted of 201 organisations. Samples were randomly chosen from two groups. The first group was those companies listed on the Nuovo Mercato (42 companies belonging to high-tec industries such as internet providers, biotechnology, entertainment, internet, IT distribution, high-tech manufacturing, media, retail, software, system integration and telecommunication, web services). The second group was of those companies listed on the Ordinario, Star and Blue Chips (159 companies belonging to "traditional" industries and including food, automobile, chemical, etc.). Disclosure by Italian companies mainly occurred with regard to external structure with particular attention to customers, distribution channels, business collaboration and brands. The results indicated that IC attributes were structurally higher for the high profile industries. However, interestingly, these high profile and low profile companies disclose the same type of information.

Although, this study pioneers the empirical research development in IC it uses a small sample and examines only two company characteristics. This finding was not comparable with Australian voluntary reporting practices (Guthrie *et al.* 1999) while it was comparable with the Irish one (Brennan 2001). Industry and size seemed to be relevant factors in explaining the differences in reporting behaviour amongst Italian companies. This result was consistent with Gray (2002) and Mathews (1997).

In contrast, Abdolmohammadi (2005) in a study of the USA found different reporting patterns in different industries. Old economy and traditional tangible asset based companies disclosed more partnership and brands whilst new economy and high technology R&D companies disclosed more IP and information technology information. Nevertheless, some investigations focus on one or two industries such as that reported by Goh and Lim (2004) in which their focus on the banking and utility industries investigated a sector normally

excluded due to different reporting regulations. Goh and Lim (2004) examined the practice of the top 20 profit-making Malaysian public listed companies on VDIC information in their annual reports (Table 2.4). Of the 20 companies, five companies were banks and another five were utility companies (electricity, gas and telecommunication companies).

The study adopted the methodology of Guthrie *et al.* (1999). Forty-one percent of IC disclosed was on RC, 36.6% on SC, consisting of IP: 1.4% and infrastructure assets: 35.2%. The remaining 21.9% was disclosed on HC. All 20 companies disclosed qualitatively but not quantitatively on management philosophy, corporate culture and entrepreneurial spirit. Ninety percent of the companies disclosed on networking system and 85% of the companies on information systems. Both attributes were quantified in the financial statements. Eighty percent of the companies disclosed on work-related knowledge and work-related competencies, respectively, which again was not easily quantified. Patent and copyright had the lowest disclosure frequency.

Overall, results show consistency in disclosure of some attributes across industries whilst some disclosures only appear in certain industries and not in others, nevertheless the significant factor is that all sample sizes are small. Following the increase in the number of sectors/industries examined in the literature, Vergauwen and Allem (2005) compared IC disclosure of public listed companies on an international level, in The Netherlands, France and Germany. IC disclosure was found to be more significant in France, significant in Germany and least in the Netherlands. Regulations and auditor conservatism have been attributed as the reasons for the variations (Table 2.4). Although the methodology applies a simple content analysis and reports results in descriptive statistics, this paper only extends prior research methodology. The results though are different as they highlight for the first time the prevalence of the IC attributes information systems (SC) and IP (SC) as the more dominant disclosures and provide for the first time a comparative international perspective; whereas Brennan (2001), April *et al.* (2003) and Bozzolan *et al.* (2003) report a higher incidence of RC attributes.

Generally, RC appears to have had more disclosure, compared with SC and HC; very limited disclosure has been made on patent, copyright, trademark, franchising agreements, know-how and vocational qualification. Lack of an

internationally recognised IC framework, has been one of the reasons advanced, compounded by the complexity of identifying, measuring and reporting; on the other hand, in some cases, the high incidence of IC disclosure may be as a result of overlapping regulations between national standards and International Accounting Standards (IAS). Companies regulated on a foreign exchange may disclose international IC mandatory attributes that are voluntary in the home country. Due to the comparative nature of the above studies, the limited empirical work conducted has been motivated by proprietary costs, political costs, stakeholder, agency and signalling theory. The results illustrate consistency in the association between industry membership, listing status and size (Williams 2001, Bozzolan *et al.* 2003 and Garcia-Meca *et al.* 2005).

2.5.0. Hypothesis Development

Section 2.2.0 to 2.4.0 have discussed and established a VDF, ICF and TF to provide the context for the statistical tests that are conducted on the hypotheses in Section 2.5.0. These tests are applied to several hypotheses pertaining to company characteristics representing risk, IC investment, industry membership and corporate governance mechanisms. The development of the hypotheses is conducted in conjunction with the review of the IC literature and general disclosure literature as presented in Table 2.4 and in Appendix 1A respectively. Furthermore, the analytical framework as illustrated in Table 2.1 is applied in predicting the hypothesised influence of the selected independent variables. The dependent variables DI and WDI and the empirical models are developed in Chapter 3.

2.5.1. Size

Numerous studies have provided evidence of a positive association between company size as measured by market value (MV), turnover (SALES) or total assets (TA) and voluntary and mandatory disclosure (Appendix 1A). Fewer studies have provided evidence of a negative association. Size as measured by MV has been confirmed as a significant positive variable in Chow and Wong-Boren (1987), Lang and Lundholm (1993), Hossain *et al.* (1994), Owusu-Ansah

(1998), Eng and Mak (2003) and Abdolmohammadi (2005). Size as measured by total assets (TA) has been confirmed as a significant positive variable in Singhvi and Desai (1971, McNally *et al.* (1982), Cooke (1991) and Camfferman and Cooke (2002) and as measured by SALES by Firth (1979), Cooke (1989), Wallace *et al.* (1994), Depoers (2000) and Naser *et al.* (2002). However, in contrast, size as measured by TA is negative in the UK study by Williams (2001) and may be due to an IC performance coefficient dependent variable and a sample restricted to only 31 UK listed companies. Similarly, size as measured by SALES is reported as negative by Wallace (1987) in a study on a mandatory and voluntary disclosure in a developing country; nevertheless, size as measured by TA was found to be significant in the same research. This variation may be due to differences in financial and economic development, regulation and cultural disclosure practices.

Within IC studies however, size has been confirmed as positively associated with disclosure by Bozzolan *et al.* (2003), Garcia-Meca *et al.* (2005), Garcia-Meca and Martinez (2005) and Guthrie *et al.* (2006). However, Williams (2001) and Bontis (2003) found size to be insignificant. Generally, larger companies increase voluntary disclosure for several reasons. Larger companies are more exposed to public scrutiny. They may respond by more VDIC. Watts and Zimmerman (1978) revealed that some companies are exposed to political costs because of lobbyists, exposure to public scrutiny, risk of nationalisation, expropriation or break-up (Jensen and Meckling 1976 and Stigler 1971). Increasing VDIC may mitigate this issue. Wallace (1987) argues that to reduce these political costs the selection of minimum disclosure policies to minimise reported earnings is necessary (Watts and Zimmerman 1978). These alternative procedures regarding political costs identified by Wallace *et al.* (1994, p.44) indicate that the theoretical basis of a relationship is unclear. The direction of the relationship may be either positive or negative. Wallace's (1987) opposing view provides evidence of larger companies withholding value relevant information to avoid the political costs in terms of tighter regulations and increasing tax, price controls, more social responsibilities and the threat of nationalisation (Jensen and Meckling 1976). Coupled with these political costs are legal costs that may lead to damages in security litigation, which Skinner (1994) suggests are greater for larger companies.

In addition, Camfferman and Cooke (2002) established that larger companies might disclose more information as they may already produce the information for internal use and therefore the additional costs of disclosure are minimal (Cooke 1989 and Lang and Lundholm 1993). Buzby (1975) suggests that small companies may not possess the necessary resources for collecting and presenting an extensive array of information in their corporate reports due to the stifling costs. Due to the large number of shareholders in companies, agency costs can be mitigated by additional voluntary disclosures (Watts and Zimmerman 1983). Moreover, due to the large number of shareholders, large companies are subject to both greater information demand from analysts (Lang and Lundholm 1993) and lower information production costs (Leftwich *et al.* 1981 and Inchausti 1997). Agency theory explains that larger companies may disclose more information to mitigate the potential of wealth transfers from shareholders to management (Jensen and Meckling 1976 and Leftwich *et al.* 1981). Larger companies are able to attract highly skilled individuals that facilitate the disclosure of an extensive array of information (Buzby 1972). Larger companies have more access to finance on the international bond market, therefore these companies may increase disclosure in order to lower the costs of capital (Botosan 1997 and Lang and Lundholm 2000) and lower the effective taxation rate. Small companies may believe more strongly that the disclosure of more detail could endanger their competitive position (Singhvi and Desai 1971, Mautz and May 1978 and Raffournier 1995). The final reason relates to market liquidity, large companies may wish to ensure that the book value of the share is matched by the share price, so that equities are appropriately priced in the secondary market, thereby avoiding the possibility of a takeover motivated by the acquisition of an undervalued company (Cooke 1996). Nonetheless, on balance, size has been found to be a very significant variable in most studies with a positive association between size and the extent of disclosure.

In the Camfferman and Cooke (2002) UK study, the TA figure, as the measure of size, is significant with a positive coefficient. The finding that size, as measured by TA, is positively associated with disclosure is consistent with the work of Cooke (1989) and McNally *et al.* (1982). Size appears to be an important explanatory variable whether measured by TA, SALES (Firth 1979),

or MV (Hossain *et al.* 1994 and Lang and Lundholm 1993). The common proxies for company size have been TA, SALES, number of shareholders, proportion of assets in place, number of employees and MV. TA, SALES and MV are applied as size proxies in this research. The selection of MV is based on the association between IC and MVBV and on the association between IC and Market value to total assets (MVTA). This research acknowledges that BV is an accounting measurement of nominal values of equity that are not related with the MV of these equities, similarly that the value of TA may be dependent on management's accounting policies. Both tangible and intangible assets contribute to the generation of turnover, SALES is therefore included as a measure of size irrespective of the IC intensity of the company or the constitution of the resource base.

The selection of TA examines the relation between capital intensity on the one hand and size on the other. Capital intensity as measured by TA does not account for the IC of equities and as such may be negatively associated with VDIC whilst concurrently, TA is the tangible capital applied in the company to generate operations and may not measure the entire capital applied in IC intensive companies. It is expected that traditional companies consist of manufacturing, heavy engineering and other fixed asset intensive industries whilst non-traditional companies are expected to be more technologically innovative and IA intensive. Traditional companies do apply IC in their operations however the level of IC is expected to be lower than that found in non-traditional tangible asset intensive companies and vice versa. This is evidenced by the market to book value phenomenon. The inclusion of the three size variables provides a comparative analysis, in which by utilising TA and SALES as controls, the effectiveness of MV as a size variable can be established. In this way, the trend in the influence of or lack of application of IC in companies' operations may begin to be chartered.

Two theoretical approaches may be applied. Management can increase VDIC due to political costs. The risk associated with size is explained by the political cost hypothesis. VDIC can be increased to avoid undue exposure to the public, providing information in anticipation of the public's increased need. Larger companies are expected to follow the research model, disclosing proprietary information to avert market adverse reaction from non-disclosure or

inaccurate disclosure. This research applies signalling theory that explains the resources available to larger companies in providing VDIC. The perceived benefits of signalling IC are expected to outweigh the potential disclosure costs arising from political costs. A significant positive association is expected. It may therefore be hypothesized that:

H1.1: Size as measured by SALES is a positive significant explanatory variable of the variation in the extent of VDIC.

H1.2: Size as measured by MV is a positive significant explanatory variable of the variation in the extent of VDIC.

H1.3: Size as measured by TA is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.2. Growth (GRWT)

A higher growth rate (GRWT) is expected to lead to more voluntary disclosure as management signal the realisation of company potential previously held in IA. Management of high GRWT companies may disclose ICCA to indicate company success (economic theory), management expertise and competence (agency theory) and to maximise shareholder value in the markets (shareholder maximisation). Lev and Stefano (2003) believe that the major drivers of company growth are IA. Such IA consist of IC in the form of innovation, information and communication technologies, networks and alliances, quality human resources and management processes that continue to be vital to companies. Lee and Shim (1995) investigated the impact of R&D on a company's long run performance (market growth) and competitiveness within the U.S. and Japanese high-tech industries. A positive relationship between R&D expenditures and a company's market growth was established in Japan.

In an empirical analysis on growth of 500 Italian manufacturing companies between 1989 and 1997, Del Monte and Papagni (2003) maintained that companies with a strong commitment to R&D had a higher rate of growth. McNally *et al.* (1992) reported an insignificant result, with voluntary disclosure

of non-financial and non-retail companies listed in New Zealand. Similarly, Eng and Mak (2003) reported an insignificant growth variable. In contrast, however, Prencipe (2004) in a study of 65 Italian listed companies identified a negative significant relationship between voluntary disclosure and the growth rate. This research extends this work, by applying a compound annual growth rate over a five-year period, to minimising year on year changes in economic conditions. It can therefore be hypothesised that:

H2: GRWT is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.3. Technological Listing (TMRK)

The understanding is that technologically innovative companies firstly, may apply more IC in their operations and secondly, may disclose such IC in their annual reports. Such high IC in technologically innovative and R&D intensive companies may be represented in a listing on a technological index. The first classification is therefore represented by the LSE TechMARK listing (TMRK). TMRK is the LSE international market for innovative technology companies and includes computer hardware, computer servicing, internet, semi-conductors, software, telecom equipment, biotechnology, specialist pharmaceuticals, drug delivery and medical technology. Following Bozzolan *et al.* (2003), the expectation is of a positive significant association. By applying content analysis, Bozzolan *et al.* (2003) confirmed the existence of a relationship between higher IC content in companies of certain industries and higher levels of VDIC within those industries. Listing on this exchange may be justified through signalling theory as the company promotes its R&D and technological development.

Nevertheless, competitive pressures may lead management to be reluctant in disclosing ICCA recently developed or on going technological processes. Thus, the “bandwagon” effect may be expected to increase disclosure whilst competitive costs are expected to suppress VDIC. Increased disclosure is expected to be more prevalent as the general trend has been that

technological companies disclose more than non-technological companies do, therefore it may be hypothesised that:

H3.1: TMRK is positive significant explanatory variable of the variation in the extent of VDIC.

2.5.4. Manufacturing (MANUF)

The second classification is supported by Camfferman and Cooke (2002), Cooke (1991) and Ho Wong (2001) who report a significant positive association between disclosure and manufacturing (MANUF). In this research, industries are classified into manufacturing, high value tangible assets, low profile; and into non-manufacturing, low value tangible assets, service, high-tec and high profile industries. A dichotomous variable is chosen, one that scores “1” for manufacturing and “0” for non-manufacturing. In general, traditional fixed asset intensive companies are classified as manufacturing and the more IA intensive companies as non-manufacturing. Although some manufacturing companies can consist of both capital intensive as well as IA intensive companies these are few, it is expected that the level of IA in such companies may not exceed the level of IA in a non-manufacturing company. A more appropriate proxy may include more than just two classifications for the manufacturing variable particularly as manufacturing and non-manufacturing are never truly distinct in any one organisation. To mitigate a potential shortcoming this research has included SIC and industry grouping (INDG) as industry variables that provide more than just two classifications.

The approach in this research is illustrated by the analytical framework developed in Table 2.1, manufacturing companies are less likely to have higher levels of VDIC as non-manufacturing companies that are expected to utilise more IC than tangible assets in their operations. The incentives are derived from signalling theory; non-manufacturing companies are expected to apply unique and non-replicable IA and IC in their operations. These companies disclose ICCA attributes due to the lack of disclosure costs, consistent with disclosures of firms with high barriers to imitation.

The nature of IC means that these resources have been found to be rare, durable, inimitable and non-tradable (Barney 1991 and Dierickx and Cool 1989); being unique, IC resources may be patent protected, may require large financial and HC resources, may take a lengthy process to develop and may be specific to certain processes, departments, companies or industries. It may therefore be hypothesised that:

H3.2: MANUF is a negative significant explanatory variable of the variation in the extent of VDIC.

2.5.5. Industry Grouping (INDG)

A further industry classification is applied in this research, INDG is a *DataStream* 6 level classification based on a company's primary activity. Equities are classified at the most detailed level appropriate as listed in Appendix 2A. The theoretical approach is consistent with manufacturing and non-manufacturing as the classification INDG charts the increasing IC content as companies move from Level 1 to level 6. The effective classification amounts to Level 2, non-financials, non-financials excluding resources, resources and Level 3, resources, basic industries, cyclical consumer products, non-cyclical consumer products, cyclical services, non-cyclical services, utilities and information technology. The classification codes "basic industries" with a lower score than it does the more complex industries. The understanding is that basic industries will disclose less IC due to the lack of complexity in their operations. Complex IT and chemical industries may provide more VDIC comparatively as they may employ more IA in their operations. INDG has provided a variety of results in the literature as illustrated by Appendix 1A.

Generally, the classifications have been subjective, providing positive and negative results and significant and insignificant results depending on the association of the classification with the disclosure index. One such study, Ng and Koh (1993) found no significant relationship between voluntary disclosure of 106 listed companies in Singapore and the complexity of operations. Similarly, McNally *et al.* (1982), Wallace *et al.* (1994), Raffournier (1995), Inchausti (1997), Patton and Zelenka (1997), Owusu-Ansah (1998) found no

significant association with industry, whereas Ng and Koh (1993), Gray *et al.* (1995) and Haniffa and Cooke (2002) found a significant negative relationship. Ng and Koh (1993) results identified industries relating to finance, properties and hotels as negative. The motivations are derived from signalling theory. High IC intensive companies are expected to apply IA and IC, unique to their organisation and therefore not easily replicable. These companies disclose ICCA attributes due to the lack of disclosure costs, consistent with disclosures in sectors of high barriers to imitation. Furthermore, such disclosures mitigate the loss in equity value where no disclosure may result in markets discounting the share price in expectation of the worst news. It may be hypothesised that:

H3.3: INDG is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.6. Standard Industry Classification (SIC)

A further industry classification applied in this research 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 (Appendix 2B). 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 rather than tangible assets in production. Agriculture, forestry and tobacco are highly mechanised industries, employing a substantial amount of tangible assets in comparison. In this way, the incentives to disclose are determined by the resource base of companies; companies with largely IA resources are expected to provide VDIC. Service and highly complex companies are expected to apply IA and IC, unique to their organisation and therefore not easily replicable.

Archambault and Archambault (2003) and Citron *et al.* (2005) find a strong positive association between disclosures and the number of SIC codes in the firm. It appears that operating in a large number of distinct industries may lead to increased disclosure; generally, companies that seek greater resources

will increase disclosure (Zarzeski 1996) as such, diversification may lead to greater disclosure (Verrecchia 1983). These companies disclose ICCA attributes due to the lack disclosure costs, consistent with disclosures in sectors of high barriers to imitation. Management may increase VDIC to illustrate their competitive edge particular in areas where there are no disclosure costs and adopt a partial disclosure policy in areas where proprietary costs may be mitigated. It may therefore be hypothesised that:

H3.4: SIC is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.7. BETA

The relationship between the beta risk factor (BETA) and VDIC may be expected to be positive. A high BETA may motivate management to increase VDIC in an attempt to mitigate exposure to systematic risk. By informing the markets and shareholders of IC within the company, management expect to reduce the risk associated with the company by reducing uncertainty as to its “hidden value” and potential. Although Foster (1978) found significant correlation between accounting annual report disclosure and systematic risk, Firth (1984) in the UK found the association of voluntary disclosure and earnings BETA to be insignificant in manufacturing companies but positive and significant with systematic risk. A weighted index was applied and the incentives were explained by agency theory. These results further emphasises the intricacy of the definitions and components of risk.

Following the theoretical approach adopted by Firth (1984), this research applies agency theory as the explanation for management behaviour. Although only 100 manufacturing companies were examined by Firth (1984), the methodology appears comprehensive, with a weighted index and multiple regression analysis (Appendix 1A.). An alternative approach however, is that a high BETA may result in management reducing VDIC. These actions allow management to perpetuate their positions at the expense of shareholders and the market at large. Timely, unmanaged and maximum disclosure of a high systematic risk status may lead to a reduced share price and ultimately

management replacement. Overall, the risk attitude of management is expected to dominate, as management and shareholder objectives are not necessarily aligned. A high-risk status presents a negative impression on management performance.

Nevertheless, following the first approach, a high-risk status is expected to result in increased IC attributes disclosure as management attempt to reduce share price fluctuations by illustrating the “hidden value” and reducing uncertainty. It may therefore be hypothesised:

H4.1: BETA is a positive significant explanatory variable of the extent of VDIC.

2.5.8. Liquidity (LQD)

This variable investigates the influence of a company’s ability to honour its short-term obligations as they fall due without recourse to selling other assets in place (Wallace and Naser 1995). One approach is that companies with higher levels of liquidity (LQD) may be expected to signal successful cash flow management through increasing VDIC. Liquidity in this case, illustrates the availability of financial resources necessary for investment in IC. Explanations for this association are based on signalling theory, consistent with management’s intentions to indicate the underlying reality and to influence stakeholders. An alternative approach may be that companies with lower levels of LQD may reduce information disclosure including IC attributes that may otherwise indicate the financial risk associated with the equity. The explanation for this association is based on agency theory.

The current ratio is commonly accepted as a measure of LQD and therefore, of short-term financial risk. The association with market risk is expected to be negative. On the one hand, a higher net LQD position allows a buffer in the event of adverse incidents. However, on the other hand, it is acknowledged that some larger companies may not need to keep large amounts of cash available, as lines of credit and other short-term borrowings are readily available. These companies are likely to disclose IC as financial risk is expected to be lower. This view is based on the expectation that a financially strong

company is more likely to disclose more information than a weak one. One reason for expecting LQD ratio to influence voluntary disclosure is that those companies with relatively high LQD ratios are more likely to meet their debt obligations. Such companies are, therefore, more likely to give more information to differentiate themselves from competitive companies. Nevertheless, the literature presents varying views.

In Australia, Craswell and Taylor (1992), found no significant association in the mandatory and voluntary disclosure of oil and gas reserves information and the cash flow risk associated with 86 companies included in the sample. The disclosure index was restricted to only one attribute based on a dichotomous scale, and the sample was restricted to one regulated industry. The result may therefore be specific to this scenario alone. Nevertheless, a significant negative result was reported in Malaysia by Hossain *et al.* (1994). The empirical studies applied 78 items to the voluntary disclosure index, and companies were selected from several industries excluding financial. A similar result is reported by Wallace *et al.* (1994) for Spain; lower operational performance, as measured by LQD might induce management to more mandatory disclosure. In this scenario, liquidity might be perceived in the market as a measure of performance, in which case a company's lower liquidity ratio may motivate management to give more details in explaining the weak performance. In a voluntary disclosure study on 106 companies in Singapore, Ng and Koh (1993), found liquidity to be insignificant.

The literature is inconclusive in respect of LQD. Wallace and Naser (1995) found in Hong Kong, that 80 listed companies' liquidity is insignificant in explaining the variation in mandatory disclosure. Owusu-Ansah (1998) concurred with this result in a multi-industry analysis on 49 companies listed on the Zimbabwe Stock Exchange that applied 214 mandatory items. Liquidity was found to be insignificant. The results of this study appear robust as new methods are applied to problems associated with the distribution of the data. A similar result was found in Hong Kong by Chen and Jaggi (2000) in almost a mirror investigation to that of Owusu-Ansah (1998), 87 non-financial companies were investigated using a 30 mandatory attribute disclosure index. Applying agency theory, liquidity was found to be insignificant.

The results of the Camfferman and Cooke (2002) study indicated that in the UK liquidity as measured by the current ratio is insignificant in explaining the variation in disclosure. Nevertheless, in the same study, liquidity also measured as the current ratio was found to be positive and significant in the Netherlands. The results of this study appear robust due to the methodology applied that was adopted from Cooke (1998). The disclosure index was based on 93 items from 322 sample companies, sufficient to provide significant results.

A more recent investigation based on the unranked OLS methodology applied in Camfferman and Cooke (2002) was conducted for Saudi Arabia on 40 companies from various industries. An insignificant result was reported for the relationship between voluntary disclosure and liquidity. Generally, the results on liquidity as illustrated in Appendix 1A indicate insignificant relationships between liquidity and disclosure, these results are insignificant in different countries and different industries and in both voluntary and mandatory disclosure. The two exceptions are Wallace *et al.* (1994) in Spain, who found a negative significant relationship and Camfferman and Cooke (2002) in the Netherlands, who applied the current ratio, and found a positive significant relationship. This research extends this work by applying a new liquidity proxy, the acid-test ratio, by eliminating stocks in this measure, this research controls for those more tangible trading operations that carry greater amounts of stock. In this way, a relationship may or may not be established between VDIC and LQD in the UK.

The acid-test ratio is operationalised as the liquidity proxy based on signalling theory as low LQD may lead to lower VDIC levels and higher LQD may lead to higher levels of VDIC as management signal successful cash flow management through VDIC. High LQD levels enable IC investment. Financially strapped companies are unable to invest in IC; as such, their disclosure levels are lower. It may therefore be hypothesised that LQD is positively associated with VDIC.

H4.2: LQD ratio is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.9. Gearing (GEAR)

The basis for the relationship with VDIC is based on the risk associated with increased levels of debt. As the proportion of debt increases for some industries, so too does the financial risk associated with repayment of interest and capital; rising debt levels may lead to an increase in the risk of the equity. Thus, an increase in the gearing ratio (GEAR) increases the probability of financial and insolvency risk. Two approaches may explain the options available to management. Firstly, to counteract this increase in risk, management may provide VDIC in a bid to illustrate transparency and accountability; and secondly, highly geared companies may not have the financial resources required firstly for investment IC and secondly for 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, have the security for debt as such, debt may be associated with more tangible asset based companies that are less likely to report IC. In addition, Williamson (1988) concluded that debt providers might be unwilling to finance projects with assets that are highly company specific and for which the expenses can be considered sunk costs; such companies may exist in industries that may be associated with IA that have reduced tradability. Research evidence has shown that R&D of a company is negatively related to its gearing (Balakrishnan and Fox 1993 and Baysinger and Hoskisson 1989). This evidence is consistent with R&D as the driver of IA growth without which there is likely to be reduced levels of VDIC.

Within the general literature, the expectation of a positive relationship in the UK is supported by Williams (2001) who applied a theoretical approach to an IC longitudinal study. A higher incidence of agency costs is associated with companies with a greater proportion of debt (Leftwich *et al.* 1981, p.56). This is consistent with Jensen and Meckling (1976) who suggest that companies with high gearing costs may incur higher monitoring costs. Further, debt providers may demand a more comprehensive level of disclosure and maintenance of

certain liquidity levels, although such information may be relayed through private disclosures. As such, gearing (GEAR) may be insignificant in explaining the variation in VDIC. The level of GEAR may be influenced by several factors including covenants, limitations on borrowings, stability of the dividend payout ratio, management practices, corporate governance structures and constitution of shareholders. Empirical evidence on the direction of the relationship between GEAR and disclosure remains inconsistent. Various proxies have been applied in establishing a relationship as illustrated by Appendix 1A. Firth (1984) applied gearing in the UK in a study of 100 manufacturing companies; the results indicated an insignificant result with voluntary disclosure. However, Watts and Zimmerman (1986) found evidence of a positive significant result in the UK, based on a questionnaire study of 212 financial executives. The negative result in Firth (1984) is mirrored in the results of a study by Chow and Wong-Boren (1987) where in Mexico an insignificant result was reported for the association between voluntary disclosure of 52 listed manufacturing companies and gearing. Both studies applied gearing and presented agency theory as the motivation for the arguments, both examined manufacturing companies and both found an insignificant result.

Subsequent studies by Gray and Roberts (1989), and Roberts and Gray (1988, cited by Meek and Gray 1989) returned contrasting results, with a negative significant result between mandatory and voluntary disclosure with gearing and a positive significant result with the debt equity ratio respectively. Both studies were conducted in the UK. Consistent with the results of Gray and Roberts (1989), Lufti (1989) established a positive significant relationship also within the UK. Although the companies examined were unlisted, the methodology appears robust; various theoretical approaches are applied, including agency theory, as the motivation for the relationship with voluntary disclosure. International studies (Appendix 1A) include Craswell and Taylor (1992), Hossain *et al.* (1994 and 1995), Raffournier (1995), Wallace *et al.* (1994), Wallace and Naser (1995), Ahmed (1996), Inchausti (1997), Patton and Zelenka (1997), Chen and Jaggi (2000), Depoers (2000) and Camfferman and Cooke (2002) in a UK study, found no significant relationship with gearing and disclosure. In contrast, Jensen and Meckling (1976), Myers (1977), Belkaoui

and Kahl (1978), Bradbury (1992), Malone *et al.* (1993), Ng and Koh (1993) Hossain *et al.* (1995), Camfferman and Cooke (2002) in the Dutch study, identified gearing as positively affecting the extent of voluntary disclosure. Meek *et al.* (1995) and Eng and Mak (2003) identified gearing as negatively affecting the extent of voluntary disclosure. The results have therefore been generally inconclusive. The methodologies applied in the above studies differed in the dependent and independent variables, in the industries, in the companies and countries of study. These differences may jointly contribute to the inconsistent results. Consistent with Balakrishnan and Fox (1993) and Baysinger and Hoskisson (1989) highly geared companies may be expected to have less IC disclosure. The arguments are based on agency theory; management may decrease VDIC; by increasing asymmetrical information management are able to perpetuate their positions in office. Such action may provide management the opportunity to turnaround failing projects, reduce gearing and ultimately secure their employment. Furthermore, 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 the investment in IC decreases. It may therefore be hypothesised that GEAR is negatively associated with VDIC.

H4.3: GEAR is a negative significant explanatory variable of the variation in the extent of VDIC.

2.5.10. Employee Cost (EMPC)

High investment in employee remuneration and benefits may result in management signalling IC attributes to disclose investment in IA that differentiates it from its competitors. The motivation for the variation in VDIC due to the variation in employee cost (EMPC) may be explained by signalling theory. Employee cost (EMPC) captures the degree to which management is efficient in hiring the optimal number of employees under the assumptions of competitive labour and product markets and in extracting value from investment in HC. High remuneration may provide the company with a competitive edge in attracting quality employees and retaining existing ones;

the signalling of ICCA attributes may ensue as management disclose successful management practice. Furthermore, Sofian *et al.* (2005) reiterate the importance of investment in HC adding that such investment is associated with management accounting practices, organisational culture and corporate performance.

Despite the benefits to be gained from disclosure of these investments, pressure from competitors, may curb full disclosure due to the mobility of employees in some industries. Furthermore, political costs may restrict such voluntary disclosures due to the risk of pressure from labour unions and other regulatory bodies. A negative association has been found between labour pressure and voluntary segment disclosure by Pourtier (1996), voluntary value-added statement disclosure by Deegan and Hallam (1991) and financial and non-financial discretionary disclosure by Depoers (2000) in their multivariate tests. Nevertheless, where management voluntarily disclose, companies can differentiate themselves from their peers through the signalling of high-quality HC (Akerlof 1970). An expectation to see companies with a higher investment in human resources voluntarily disclosing more HC exists. However, one approach recognises employee pressure as a dominant force, which particularly for cohesive labour unions may demand transfers of wealth under the form of wage demands (Liberty and Zimmerman 1986). A no disclosure policy may be considered appropriate if disclosure increases the bargaining power of labour unions or increases the potential for competitors to attract a company's existing employees. Theoretical explanations are taken from agency theory and proprietary costs theory in a study by Depoers (2000) in which he found a significant negative relationship between labour pressure and voluntary disclosure. These results were consistent with the predictions of Darrough (1995) who concluded that management conceals information as readily from their employees as they do from their competitors. The measure of EMPC applied in this research is the ratio of staff costs to number of employees.

Various proxies have been examined (Appendix 1A) to try to capture the HC content in companies, Singhvi (1968) and Wallace (1987) examined the type of management, and reported a significant relationship with mandatory and voluntary disclosure of 45 listed Indian companies and 87 non-financial Nigerian listed companies respectively. In Bangladesh, Ahmed (1996) found no

relationship between mandatory and voluntary disclosure and qualifications of the accounting officer whereas Patton and Zelenka (1997) found a positive significant relationship between mandatory disclosure and number of employees, although this variable may also proxy for size. An insignificant relationship was established between the qualifications of the financial director and voluntary disclosure of 138 non-financial listed companies in Malaysia and employees and mandatory and voluntary disclosure of 84 manufacturing and service listed companies in Jordan by Haniffa and Cooke (2002) and Naser *et al.* (2002) respectively. This research hypothesises 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. The arguments are derived from signalling theory and the propensity of companies to disclose their competitive advantage. These motivations are expected to outweigh any competitive pressures and labour related proprietary costs that are associated with such disclosures. It may be hypothesised that EMPC is positively associated with VDIC.

H5.1: EMPC is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.11. Research and Development Expenditure (R&D)

The expectation is a positive association between research and development expenditure (R&D) and VDIC. R&D is associated with the generation of IC that is inimitable and company specific. This unique IC may provide a barrier to imitation for competing firms. High R&D companies are likely to be characterised by high levels of VDIC due to the reduced proprietary costs attributed to barriers to imitation. This variable identifies whether R&D necessarily leads to VDIC. Although R&D is associated with IA generation, IP registration of patents and copyrights, some registrations for patents may be lengthy processes. R&D may signal success to the market, as investment in IC is made possible through surplus earnings.

The theoretical relationship between R&D and VDIC may be unclear because no previous study has been found to investigate this relationship. Clarkson *et al.* (1994) found a significant relation between barriers to imitation and the voluntary inclusion of forecasts in Canadian companies' annual reports. The proxy applied in this study was gross fixed assets as a financial barrier to access. This variable may however be a proxy for size as disclosure studies have illustrated that larger companies provide more voluntary and mandatory disclosure. Gray *et al.* (1995) study examined R&D information in contrast to this research that examines R&D expenditure. However, Gray *et al.* (1995) study confirmed a positive significant relationship of R&D information with general voluntary disclosure of 64 UK and 116 USA companies. The theoretical motivation was based on legitimacy theory and the disclosure index comprised 128 voluntary disclosure items. Depoers (2000) examined 65 voluntary disclosure items in a French study on 102 non-financial industrial companies. The results confirmed a positive association between disclosure and barriers to imitation; indicating that the existence of barriers to imitation increases disclosure. R&D is defined as all direct and indirect costs related to the creation and development of new processes, techniques, applications and products with commercial possibilities. As R&D has been found to increase IA and growth prospects, this research expects an increase in VDIC associated with new venturing activities/projects. Investment in R&D is traditionally considered an internal innovation that expands companies' capabilities over time (Hoskisson *et al.* 1994). Myers (1977) suggests that R&D creates IA and company specific assets. Sustained R&D leads to stable growth (Hall and Mairesse 1995). The association between R & D, technological development and growth have been empirically established at the company, industry and national levels. R & D has led to subsequent gains in productivity, earnings and shareholder value (Griliches and Regev 1995, Lev and Sougiannis 1996, Deng *et al.* 1999 and Gelb and Siegel 2000). R&D's innovativeness affects the marginal costs of production. Greater R&D spending translates into lower expected marginal costs. Management in R&D intensive companies may disclose more IC as a measure of signalling potential and successful projects.

Nevertheless, as indicated by Williams (2001, p.201), where IC performance is too high the amount of disclosure may be reduced, suggesting

that companies reduce VDIC when performance reaches a threshold level for fear of competitive losses. However, competitive costs may be exceeded by potential benefits of signalling when proprietary costs may be mitigated by barriers to imitation. These barriers may be due to the complexity of IC and the requirement for additional financial resources, technical expertise and corporate governance mechanisms. It may therefore be hypothesised that R&D is positively associated with VDIC.

H5.2: R&D is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.12. MVBV

Edvinsson and Malone (1997) define the difference between a company's BV and MV as the value of IC. This research acknowledges the existence of this "hidden value" which when disclosed, enables markets to operate more efficiently. Due to the inability of traditional financial statements to report SC, RC and HC, IC intensive companies are likely to have a larger difference between MV and BV. An example of this MVBV difference is provided by Dzinkowski (2000) in which Microsoft's unrecognised intangible assets amounted to 11.2 times the tangible assets. To match the equity market, management may be expected to provide VDIC to bridge the gap created by this difference. They suggest that VDIC is likely to be higher where the MVBV ratio is larger. Although the assumption that IA are represented by this difference has been adopted by several authors (Federal Accounting Standards Board 2001, Frankel *et al.* 1999 and Tasker 1998), the assumption is not widely accepted as representing the level of IA. Findings by Lev and Sougiannis (1999) illustrate that price earnings ratios and market to book ratios may be misstated by analysts and various user groups. Furthermore, Lev (2001) points out that MVBV were well in excess of one in the 1950s and 1960s so that this gap is not new. Nevertheless, Lev (2001) suggests that three areas may be attributed to this difference. However, various authors have indicated ways in which voluntary disclosure may mitigate the shortfalls within the traditional reporting framework.

Firstly, the market values IA differently to the accounting valuation. The greater the extent of VDIC the more accurate the predictions of future earnings (Leuz and Verrecchia 2000). These future earnings are associated with market value that accounts for both tangible, intangible assets and growth prospects (Frankel *et al.* 1999). Secondly, the market accounts for sources of IA value not recognised on the balance sheet as such, the greater the extent of VDIC the more the upward rise in revision in equity valuations (Healey and Palepu 1993). VDIC requires the identification of individual IC attributes and therefore the individual sources of IA generation. Thirdly, increased VDIC including the company's plans, opportunities, risks and other factors unrelated to intangibles may result in increased liquidity and tradability and decreased cost of capital (Botosan 1997).

Few studies have conducted a direct empirical investigation on MVBV and disclosure. Patton and Zelenka (1997) found no significant relationship between mandatory disclosure and percentage of IA in the resource base. The explanations were based on signalling theory however, little IA have 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 IP. Tobin's Q has also been studied with respect to establishing a relationship with the "hidden value"; this research applies MVBV and MVTA ratios as its proxies for this "hidden value". The theoretical approach applied in the development of this hypothesis is based on explanations from the RBV and signalling theory.

The motivations for an expectation of a positive association are derived from Garcia-Meca *et al.* (2005) that confirm MVBV as a positive significant variable in the presentation of information to analysts. The main concern with bridging the MVBV gap is the reliability, objectivity of estimates required for capitalisation of IA. Signalling theory explains that management may be motivated to disclose more IC when the MVBV 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. These companies are expected to disclose the investment that would otherwise remain

invisible to shareholders and stakeholders alike. Whilst recognising that MVBV is an imperfect measure of IA (Brennan 2001), it remains nevertheless a function in part of this difference as such companies with higher levels of IA may have more unrecognised IC to communicate in narratives. Given this deficiency in book value, this research develops a sensitivity test in the ratio of market value to total assets (MVTA) that may proxy for the difference between intangible and tangible assets based equities. The proxies for this “hidden value” are therefore MVBV and MVTA. It may therefore be hypothesized that:

H5.3: MVBV is a positive significant explanatory variable of the variation in the extent of VDIC.

H5.4: MVTA is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.13. Experienced Non-executive Directors (EXPRCD)

Non-executive directors (NONEXEC) are perceived as a tool for monitoring management behaviour and may result in more VDIC. 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 the more reliable in diffusing agency conflicts between managers and owners and in providing the necessary checks and balances needed to enhance board effectiveness. As such, NONEXEC may not exert sufficient monitoring power if their numbers only account for a small proportion of board membership (Ho and Wong 2001).

This research introduces experienced non-executive directors (EXPRCD) as a corporate governance variable defined in this research as NONEXEC that hold more than one directorship in different listed companies (Kosnik 1987, p.171). This research acknowledges that the mere increase in the number of NONEXEC does not necessarily improve decision-making or performance (Walsh and Seward 1990, Hermalin and Weisbach 1991, Baligia *et al.* 1996, Romano 1996 and Kren and Kerr 1997 and Haniffa and Cooke 2005). 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. Therefore, it appears that only those directors that bring expertise on board may influence effective board monitoring and company performance (Useem 1993). Fama and Jensen (1983) suggested that those directors who sit on several corporate boards have developed this experience and related reputation capital. This reputational capital is expected to provide the necessary expertise (Gul and Leung 2004). Kosnik (1987) suggested that this expertise might be measured in terms of whether the outside directorships relate to unconnected companies. This relationship is sometimes referred to as cross-director-ships. In as much as appointment of a large audit firm may be used as a signal of the existence of reputational capital, so too can the appointment of EXPRCD.

Investment in attracting and retaining such expertise may lead to signalling of successful management practices and company performance sufficient to maintain such a calibre of EXPRCD. The theoretical approach may be linked to signalling of ICCA attributes. Nevertheless, an alternative approach examines EXPRCD as a monitoring mechanism that mitigates the effects of agency costs. EXPRCD directors may be instrumental in reducing information asymmetry between management and shareholders. This research adopts this approach based on agency theory, the more experienced the EXPRCD the greater will be the level of IC attribute disclosure. In a study on unlisted companies in the UK, Lufti (1989) reported an insignificant result on the influence of NONEXEC on voluntary disclosure. Similarly, in the US Malone *et al.* (1993), reported an insignificant result between mandatory and voluntary disclosure and proportion of outside directors. Limitations are found in both these studies, in the first, only unlisted companies were examined placing questions on the comparability of NONEXEC from listed and unlisted companies. In the second, the study was limited to oil and gas companies.

These studies are followed by Ho and Wong (2001) and Haniffa and Cooke (2002) who confirmed the insignificant results as above, applying agency theory, Ho and Wong (2001) examined 98 listed companies employing a voluntary index of 20 items and Haniffa and Cooke (2002) applied agency theory in establishing an insignificant result. On the one hand, Adams and

Hossain (1998) and Chen and Jaggi (2000) found empirical evidence of a positive relation between proportion of independent directors and mandatory disclosure in Hong Kong. On the other hand, Eng and Mak (2003) found that NONEXEC is associated with reduced voluntary disclosure. The disclosure attributes differed in these studies, one examined mandatory and the other voluntary disclosure. Furthermore, the studies were conducted in different countries. When objectives of EXPRCD are prejudiced against shareholders, agency theory may explain low IC disclosure levels. As such, this study applies the ratio of EXPRCD to total directors on the board. Those that support this view, base their arguments on agency theory that views EXPRCD as a check and balance mechanism in enhancing board activities by monitoring and controlling the actions of executive directors.

Jensen and Meckling (1976) suggest a framework on agency theory for linking management disclosure behaviour and corporate governance. Fama and Jensen (1983), Pettigrew and McNulty (1995) and Mak (1996) share the same framework. In addition, EXPRCD are seen to be independent and not intimidated by the chair (Weisbach 1988), able to reduce managerial consumption of prerequisites (Brickley and James 1987) and act as a positive influence over directors' decisions (Pearce and Zahra 1992). This research adopts agency theory in explaining 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. Moreover, these EXPRCD provide various resources on world affairs (Tricker 1984), as such they are seen more in an advisory capacity than decision-making role (Mace 1991 and Spencer 1993).

Other studies in favour of NONEXEC domination on boards include Kesner and Johnson (1990) and Grace *et al.* (1995). Where management is heavily reliant on the advice of EXPRCD, VDIC may be expected to increase due to the prudence and conservative approach of EXPRCD. Management may be dependent on EXPRCD for expert advice and may be sufficiently influenced to increase VDIC. In contrast, arguments against the effective influence of NONEXEC in general include stifling strategic actions (Goodstein *et al.* 1994), excessive monitoring (Baysinger and Butler 1985), lack of business knowledge (Patton and Baker 1987) and lack of real independence (Demb and Neubauer

1992). Nevertheless, multiple or cross-directorships are expected to promote transparency and accountability that may lead to increased VDIC. It may therefore be hypothesised that:

H6.1: The ratio of EXPRCD to total directors is a positive significant explanatory variable of the variation in the extent of VDIC.

2.5.14. Executive Remuneration (EXCREM)

A high executive remuneration (EXCREM) may be motivated by self-interests of the executive, secondly, a high ratio may indicate susceptibility to financial risk as payments are diverted from shareholders to the executive thus reducing shareholder returns and increasing unsystematic risk. High EXCREM may be associated with low VDIC. The separation of ownership and control may be exacerbated by the incidence asymmetry of information as management exploit their information advantage to the detriment of stakeholders. A negative association may be expected between EXCREM and VDIC.

This research adopts the approach in which a negative association is expected. Although both the theoretical arguments and the direction of the relationship have been reported as unclear, Lufti (1989) identified share option schemes as positive and significant in influencing voluntary disclosure in UK unlisted companies. This study applied share option scheme as a proxy for remuneration and benefits that management may accrue during their employment. Agency theory was applied as the theoretical approach suggesting that EXCREM is linked to agency theory within disclosure studies. The incidence of agency costs is exacerbated by the existence of high remuneration packages. The need for management to ensure continuance in office may result in agency costs; asymmetry of information may be prevalent, leading to management diverting profits from dividends to EXCREM. As such, it may be hypothesised that:

H6.2: EXCREM is a negative significant explanatory variable of the variation in the extent of VDIC.

2.5.15. Non-executive Chair (CNED)

Within corporate governance, an important issue is the existence of dual roles within management. According to agency theory, combined functions can significantly impair the board's most important functions of monitoring, disciplining and compensating senior managers (Barako *et al.* 2006). Such combined roles may enable the engagement of opportunistic behaviour because of dominance over the board. Forker (1992) presented evidence of a negative relationship between disclosure quality and corporate governance as measured by "dominant personality" providing additional support for the findings of Fama and Jensen (1983, p.314) that combined roles signal the absence of separation of decision management and decision control. Independent board leadership as measured by non-executive board chair was found to have an association with higher company performance in Berg and Smith (1978, cited by Davis *et al.* 1997), Schoorman and Donaldson (1997), Daily and Dalton (1994, cited by Davis *et al.* 1997) and Rechner and Dalton (1991, cited by Davis *et al.* 1997). Several investigations have revealed that stewardship's executive chaired boards have significantly higher corporate performance (Donaldson and Davis (1989, cited by Davis *et al.* 1997) and Donaldson and Davis (1991, cited by Davis *et al.* 1997) and Finkelstein and D'Aveni (1994, cited by Davis *et al.* 1997). Nevertheless, other research has suggested no significant difference in performance between executive and non-executive board chairs in Chaganti *et al.* (1985, cited by Davis *et al.* 1997) and Molz (1988, cited by Davis *et al.* 1997). In their investigation, Davis *et al.* (1997) found that the company realises the most benefits when both agent and principle develop a stewardship relation.

Applying this theoretical model to VDIC, non-executive chair (CNED) may be associated with VDIC. No studies have yet investigated this relationship within IC, 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. The literature indicates that executive board chairs are associated with higher levels of disclosure in general. This study further confirmed independently that role

duality and chair were insignificant in influencing voluntary disclosure. This particular study appears robust, investigating a large sample of 138 non-financial listed companies from different industries in Malaysia. Lack of alignment of shareholder and management objectives may lead to agency costs. The optimum balance would be to remove the risk to the company of the CNED being accountable for two functions, non-executive director and chair. The company may benefit from access to the external knowledge to which the role of NONEXEC may encompass. In the role of chair, the alignment of the interests of management and shareholders by reducing monitoring costs remains a priority. On the one hand, in the capacity of NONEXEC with respect to external commercial links may create an environment in which company business is heavily reliant on the chair's personal characteristics and personal contacts. In such a case, VDIC may easily be manipulated by the CNED as the extent of asymmetric information is expected to be high.

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. However, expert knowledge of the external business environment due to external contacts may curb agency costs. On the other hand, as part of the management team and in the role of CNED, agency costs explain that information asymmetry may increase. This research applies agency theory, as the combined role of CNED is likely to require increased monitoring. A negative association is expected between VDIC and CNED consistent with the research model and the first theoretical approach. A dichotomous proxy is developed scoring "0" for an executive chair and "1" for a CNED. It may therefore be hypothesized that:

H6.3: The role of CNED is a negative significant explanatory variable of the variation in the extent of VDIC.

2.5.16. Directors' Shareholding (DIRSHS)

The reasons for expecting managerial share ownership (DIRSHS) to be associated with VDIC are mainly based on agency theory. Jensen and Meckling (1976) and Leftwich *et al.* (1981) noted that agency costs are associated with

increasing levels of non-owner management in a firm. These agency costs arise from the separation of the principals (shareholders) from the decision-making function in the firm. DIRSHS may be an effective approach to aligning management attitudes and objectives with those of shareholders, providing the impetus to act in the best interests of all shareholders including themselves. Where these are not aligned, one way of reducing agency costs may be through the voluntary provision of additional information to the principals (shareholders) about the outcomes of management decisions made by the agent on the principals' behalf (Whittred 1987, Watts 1977 and Craswell and Taylor 1992). For example, disclosure of IC may be considered useful additional information to shareholders about the outcomes of management's decisions as it provides information allowing shareholders to assess more accurately the risk/return profile, the growth prospects and the IC of a company as a whole. Thus, increases in DIRSHS may be associated with increased VDIC, however O'Sullivan (2000) argues that when there is significant managerial ownership less disclosure may be expected as agency costs are reduced and the monitoring motivation for disclosure may be reduced.

Finkelstein (1992) and Zahra *et al.* (1993) further argue that ownership empowers executive directors, enabling them to generate new business incentives and strategies, increase innovation and enable the company to adapt more quickly to a changing environment, in addition to allowing executive directors to develop better strategies in allocating resources to diverse stakeholders, thereby enhancing a company's image and reputation. Moreover, Hansen and Hill (1991) suggest that DIRSHS provides management with an incentive to focus on long-term viability of the company such as IC. Furthermore, in terms of Gray (1988) "secrecy hypothesis", with increased DIRSHS, directors' preference for secrecy is likely to decrease leading to disclosure of more information; in this case, directors act more as principals than as agents. The marginal cost to management of providing this additional IC may be much lower than the cost to individual equity holders of ascertaining the same information. Such disclosure may, reduce agency costs (McKinnon and Dalimunthe 1993). The literature has been inconclusive with some authors supporting an increase in DIRSHS leading to an increase in VDIC, whilst others take the opposing view. This research adopts the view that the

relationship between DIRSHS and VDIC is expected to be negative. As managers' share ownership decreases, the conflict between shareholders and management increases (Jensen and Meckling 1976, Watts 1977, Chow 1982, Dhaliwal *et al.* 1982). As such, sufficient transparency and accountability would enhance disclosure of IC and ensure the share price reflects the "hidden value".

Share options and management shareholdings have been introduced over the past years to bridge the gap between the agent and the principle. By rewarding the agent with a share of ownership and a share of profits, shareholders have hoped to align their own goals and the objectives of management. Owusu-Ansah (1998) confirmed an association between inside ownership and mandatory disclosure in a mandatory investigation on 49 Zimbabwean listed companies. The disclosure index consisted of 214 disclosure attributes and the motivations were based on agency theory. Besides the limited number of companies, the investigation appeared robust. In contrast, Eng and Mak (2003) report a negative result between managerial ownership and voluntary disclosure. The sample consisted of 158 listed companies and 46 items were weighted as the basis for the disclosure index. Country differences may be the reason for differences in these results; in addition, Owusu-Ansah (1998) investigated mandatory disclosure as opposed to Eng and Mak (2003) who examined voluntary disclosure. On the one hand, agency theory explains manager behaviour commensurate with self-serving interests below a threshold level of beneficial ownership. On the other hand, above this threshold, the manager tends to behave more like a shareholder than an agent, management and shareholder aims are aligned. Management share ownership may be considered as a direct signal of confidence to the market to invest in the company's equity. An increase in VDIC may ensue as management signal this confidence; an increase in beneficial shareholding is expected to result in increased VDIC as monitoring costs are reduced. The proxy for this variable is the ratio of DIRSHS to the total shareholding and is defined as directors' beneficial shareholding in the ordinary equity of the company. It may therefore be hypothesised that:

H6.4: DIRSHS is a positive significant variable in the variation of the extent of VDIC.

Table 2.5 Variables and Hypotheses Development

Hypothesis	Variable	Empirical Measure	Expected Sign	Theory Applied	Acronym	Definition	Source
H1	Size	H1.1: Sales	+	Signalling theory	SALES	Net sales or revenues representing gross sales and other operating revenue less discounts, returns and allowances	<i>DataStream</i>
		H1.2: Market value	+	Signalling theory	MV	The sum of tangible fixed assets, IA, investments (including associates), other assets, total stocks & WIP, total debtors & equivalent and cash & cash equivalents	<i>DataStream</i>
		H1.3: Total assets	+	Signalling theory	TA	Market value is the share price multiplied by the number of ordinary shares in issue	<i>DataStream</i>
H2:	Growth	H2: Growth	+	Signalling theory	GRWT	5 year compounded annual sales rate.	<i>DataStream</i>
H3	Industry	H3.1: TechMARK	+	Signalling theory	TMRK	Listing on the TechMARK index	LSE TechMARK listing
		H3.2: Manufacturing or non-manufacturing	-	Signalling theory	MANUF	Manufacturing or not manufacturing	Annual Report
		H3.3: Industry Grouping classification number	+	Signalling theory	INDG	Level 6 industrial classification number	<i>DataStream</i>
		H3.4: Standard Industry Classification	+	Signalling theory	SIC	Several levels of Industries classifications	National Statistics (2003)

Table 2.5 Variables and Hypotheses Development (cont)

Hypothesis	Variable	Empirical Measure	Expected Sign	Theory Applied	Acronym	Definition	
H4	Risk	H4.1: The beta factor	+	Agency theory	BETA	The BETA factor of a stock relates movements in its price to movements in the market, as a whole. Over a period it expresses the relative movement of the price against the market, showing the likely relative change for a given market movement and whether the stock is prone to under- or over-react	<i>DataStream</i>
		H4.2: Liquidity	+	Signalling theory	LQD	Quick assets ratio	<i>DataStream</i>
		H4.3: Gearing	-	Agency theory	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	<i>DataStream</i>

Table 2.5 Variables and Hypotheses Development (cont)

Hypothesis	Variable	Empirical Measure	Expected Sign	Theory Applied	Acronym	Definition	DataStream
H5:	IC	H5.1: Employee cost	+	Signalling theory	EMPC	Staff costs including all employee benefits such as health insurance and pension plan contributions / employees represent the number of both full and part time employees of the company.	DataStream
		H5.2: Research and development expenditure	+	Signalling theory	R&D	R&D represents all direct and indirect costs related to the creation and development of new processes, techniques, applications and products with commercial possibilities	DataStream
		H5.3: Market to book value ratio	+	Signalling theory	MVBV	The ratio of market capitalisation to book value	DataStream
		H5.4: Market value to total assets ratio	+	Signalling theory	MVTA	The ratio of market capitalisation to total assets	DataStream
H6:	Corporate governance	H6.1: Experienced non-executive directors	+	Agency theory	EXPRCD	Ratio of EXPRCD to total directors	Annual Report
		H6.2: Executive remuneration	-	Agency theory	EXCREM	Executive remuneration	Annual Report
		H6.3: Non-executive chair	-	Agency theory	CNED	Chair who is a non-executive director	Annual Report
		H6.4: Directors beneficial Shareholding	+	Agency theory	DIRSHS	Directors beneficial shareholding in the ordinary equity of the company	Annual Report

2.6.0. Summary of Hypotheses and Model Development

In Chapter 2, this research has defined the VDF, TF and the ICF; furthermore, based on the analytical framework presented in Table 2.1, 18 hypotheses have been developed linking investment in IC, financial measures of risk, industry membership and corporate governance with VDIC utilising agency theory, proprietary cost hypothesis and combining the RBV and signalling theory. Table 2.5 above, summarises the selected variables, proxies and the hypotheses developed for empirical tests in Chapters 5 to 9. Chapter 3 discusses the research methodology.

3. Methodology

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3.1.0. Introduction

This chapter is divided into two basic sections. The first examines the methods applied in calculating the dependent variables, the disclosure indices (DI and WDI). The second examines statistical methods applied in testing the hypothesised influence of investment in IC, financial measures of risk, industry membership and corporate governance mechanisms developed in Chapter 2. A VDF, that incorporates the three disclosure outcomes of minimal, partial and maximum disclosure and the ICF that defines SC, RC and HC attributes, was developed in Chapter 2. In addition, several hypotheses were developed linking selected independent variables with agency theory, proprietary cost hypothesis, the RBV and signalling theory. The methods applied, in data gathering through to the scoring of each annual report and the calculation of a DI and WDI for each of the sample companies, are discussed in this first section. Annual reports are chosen as the source of the data as they are easily obtainable, the content of the report is determined by management and the annual report is widely distributed to the public (Campbell 2000). Furthermore, annual reports have been applied extensively in IC studies (Guthrie and Petty 2000, Brennan 2001, Bozzolan *et al.* 2003 and Guthrie *et al.* 2004) as they are considered major public documents that influence financial markets and the manner in which the public perceives and reacts to companies. The methodology begins by describing the sampling procedure applied in selecting companies included in the content analysis and in the tests of the hypotheses.

3.1.1. Sampling Procedures

Companies were selected from the FTSE All Share Index for the year 2003/2004 in the *Financial Times*. The *Financial Times* publication was assessed as suited to the needs of this research as it provides all listed companies in fitting alphabetical industry category; companies within industries are similarly listed alphabetically. Every second and third company was systematically selected from the population with the exclusion of companies in the banks, financial, insurance, life assurance, mining, oil and gas, real estate, speciality and other finance and investment and property industries. These

industries generally have additional reporting regulations; in particular, banks and insurance companies have industry-specific disclosure requirements that do not apply to other companies. This meant that if the second or third company was in an excluded category the next category on the list was selected and the next company on the list would be selected and the counting began again. Of the 732 companies in the population after removing the excluded companies, the theoretical sample was 488 as indicated in Table 3.1.

Table 3.1 Sample selection

Number of companies in the FTSE ALL SHARE Index	1440
Number of banks, insurance, life assurance, mining, oil and gas, real estate, speciality and other finance and investment companies	<u>(708)</u>
Population	732
Sample select every 2 nd and 3 rd (1/3)	<u>(244)</u>
Sample (theoretical)	488
Non-respondents	<u>(24)</u>
	464
Suspended	<u>(4)</u>
	460
Floated in current year	<u>(3)</u>
	457
Less than 12 months trading	<u>(7)</u>
	450
Mergers/takeover	<u>(7)</u>
	443
Incomplete data	<u>(4)</u>
Final sample	439

Source: Annual Reports

A letter requesting an annual report for the financial year ending 2004 calendar year was sent to all 488 companies. After one month, the first reminder was despatched followed by the second reminder after a further month to those companies that had not responded to earlier requests. Initially, 407 companies mailed their annual reports forming 83% response rate and therefore 28% of the total population of FTSE All index companies. Evidence from prior literature reveals no consistent method of selecting the number of sample items to include in DI; past studies have varied on this variable. After three months from the date of the first letter, several annual reports were still outstanding. At

this stage, those companies that had not responded at all were emailed to request their annual reports. More annual reports were received from companies on the final request. The final sample of 439 listed companies is investigated in this research comprising 91% response rate and 31% coverage of the FTSE All Share Index. The sample selection process is summarised in Table 3.1. Non-respondents have been considered to have no bias on the sample as they effectively account for 2% of the theoretical sample; these companies represent all industries; and have varying size values as measured by MV, indicating that non-respondents are neither sector nor size biased. In the next section, this research examines the methods applied in scoring the IC attributes.

3.1.2. The Dependent Variable

Since the early study by Cerf (1961), several different approaches have been applied in determining disclosure quality and quantity. Disclosure is an abstract construct the nature of which does not lend itself well to the determination of its intensity or quality (Wallace and Naser 1995). Hackstone and Milne (1996) found that a disclosure index or content analysis could be applied in the measure of the dependent variable. Various constructs used in prior studies are discussed below, Buzby (1974) applied adequacy as the dependent variable by assessing whether each annual report met a set of minimum standards i.e. mandatory regulations. Whereas, Patton and Zelenka (1997) studied the extent of disclosure which generally identifies whether an item is disclosed or not but may not determine the depth of the disclosures. The value of information may change depending on the timeliness of disclosure. Curtis (1976) and Whittred (1980) investigated timeliness of annual reports as a construct for assessing disclosure. They determined whether, the time of release was affected by good or by bad news. Moreover, they considered whether qualification or non-qualification of the audit report affected timeliness. A further construct was reported by Alford *et al.* (1993) who examined the informativeness of annual reports as to whether the direction of share prices and returns was indicated by the reported accounting earnings. Informativeness was described as the information content and timeliness of accounting earnings in 17 countries

including the USA. The results indicated significant differences between countries in the timeliness and information content of accounting earnings.

These varying results are attributed to differences in capital markets, accounting standards, disclosure practices and corporate governance systems. Barrett (1977) and Wallace *et al.* (1994) investigated comprehensiveness. The authors investigated comprehensiveness by ensuring that no important aspect had been left undisclosed and by rewarding an information item with substantial detail. Comprehensiveness is a construct of quality. Imhoff (1992) suggests, "High accounting quality is closely associated with full disclosure". This research refers to the extent of disclosure as its construct due to the nature of the method of content analysis applied in determining DI. Nevertheless, the literature reveals that each construct enables disclosure to be measurable along a continuum ranging from poor to excellent. The construct of comprehensiveness as measured by Barrett (1977) and Wallace *et al.* (1994) lends itself well to the adopted definition of WDI in this research. The information items of the index varied substantially in volume. In addition, some of the disclosure indices were weighted based on the perceptions of users while some others were unweighted.

Parallel studies conducted by Spero (1979), Robbins and Austin (1986) and Chow and Wong-Boren (1987) have revealed no significant difference between weighted and unweighted disclosure indices. The literature has illustrated two approaches to index development; the first is questionnaire based and adopts various user-ranked accounting factors to construct a list of voluntary and mandatory disclosure attributes (Buzby 1974, Chandra 1974, Firth 1978 and Turkey 1985). The second is based on an author constructed disclosure indices of mandatory, voluntary or total accounting disclosure under an established framework. Researcher/author-constructed index have formed the majority of studies. Imhoff (1992) and Lang and Lundholm (1993) used disclosure indices created by analysts. Gray *et al.* (1995), Adrem (1999), Williams (2001) and Ferguson *et al.* (2002) and in mandatory disclosure by Ahmed and Nichols (1994), Wallace *et al.* (1994), Inchausti (1997), Jaggi and Low (2000) and Richardson and Welker (2001) author constructed indices were employed in their annual reports studies.

This research adopts the second stream, as a DI and WDI are author-constructed. DI is measured based on the construct of the extent of disclosure and WDI is measured based on the construct of the competitive advantage in the disclosure. These two constructs are applied to identify in DI the existence or not of an IC attribute and in WDI the existence or lack thereof of ICCA attribute. The establishment of a framework based on a set of defined ICCA and IC attributes and a tried and tested content analysis reduces the subjectivity that may be associated with author-constructed indices. The steps taken to ensure reliability of the indices are included in subsequent sections of this chapter. This research defines competitive advantage from a practical perspective as:

An ICCA attribute disclosed as a unit of analysis that identifies certain processes within management that include the acknowledgement and identification of a dynamic organisational process to manage, develop, maintain and report IC.

Furthermore, at the ICCA attribute level, this research, applies the assessment of competitive advantage to each individual IC attribute. Following the strategic building blocks of competitive advantage summarised by Flamholtz and Hua (2003), this research links IC disclosure with specific competitive advantage attributes. The first identifies a viable market niche (Freeman and Hannah 1983) as a strategic building block accounted for in RC and including brands, customers and business collaborations. The second is associated with the development of products and services for a market niche (Midgely 1981), and may be attributed to entrepreneurial spirit, innovation and creativity embedded in HC. The third includes acquisition and development of resources required to operate the company (Caroll and Yangchung 1986) accounted for in the ICF under SC and relating to financial relations, IP and information systems.

The final three competitive advantage building blocks as summarised by Flamholtz and Hua (2003) include operational systems (Starbuck 1965), management systems (Tushman *et al.* 1985) and organisational culture (Flamholtz and Aksehirli 2000) that are found under SC within the ICF. From a practical point of view, characteristics such as proactive development, successful implementation, periodic or on going improvement and maintenance

of IC within the company when coupled with value-creating strategies increase market share (RC), support brand development (SC) and maintain good employee relations (HC).

These strategies provide a competitive advantage, as they are not simultaneously being followed by any current or potential competitors (Clulow *et al.* 2003), that suggests the existence of ICCA attributes whereas DI measures the existence or not of IC, a unique product, service, process, IP, relationship or human resource. In this manner, DI and WDI can be evaluated and compared in ascertaining whether the quality-adjusted index reflects the significance of competitiveness.

3.1.3. Content Analysis

A content analysis of the entire annual reports of a sample of listed companies was conducted by adapting the methodologies of Guthrie *et al.* (1999), Bozzolan *et al.* (2003) and Milne and Adler (1999). Krippendorff (1980) first reported on the use of content analysis, further developments and adaptations have cumulated in several authors applying it in disclosure studies particularly Gray *et al.* (1995) and Guthrie *et al.* (2004) who detail its usefulness in investigating disclosure of IC in annual reports. Content analysis has been widely used in social and environmental disclosure (Guthrie and Parker 1990, Zeghal and Ahmed 1990 and Milne and Adler 1999). Content analysis has been carried out in several studies of accounting and IC including Abbot and Monsen (1979), Andrew *et al.* (1989), Choon *et al.* (2000), Guthrie and Mathews (1985), Olsson (2000) and Subbarao and Zeghal (1997). This involves codifying IC attributes into SC, RC and HC in order to derive patterns in the presentation and reporting of IC (Guthrie and Petty 2000, p.244).

This approach is deemed systematic, objective and reliable in determining the content of written publications and can be used to make replicable and valid inferences (Krippendorff 1980 and Guthrie and Petty 2000). In accordance with the three conditions set by Krippendorff (1980) for the existence of reliability (Milne and Adler 1999), inferences may be drawn from this research, as various steps have been taken to ensure that the coding is accurate, reproducible and stable. The following steps taken to ensure reliability

Table 3.2 ICF: Intellectual Attributes

Internal Structural Capital SC (8)	External Relational Capital RC (8)	Human Capital HC (7)
1. Patents (Proprietary process, Trade secrets, Methodologies)	9. Brands (Brand recognition, development, Sales per brand, Number of brands, Reconciliation of numbers)	17. Know-how (Competence, Intelligence, Knowledge, Motivation, Brainpower, Specialist, Expertise, Skills)
2. Copyrights (Copyrights)	10. Customers (New customers, Customer lists, items, satisfaction, Sales by segment, region, Market share, Order book, Long-term sales contracts and information)	18. Training (Third party certification, Certificate, Professional qualification, In-house training, External courses)
3. Trademarks (Trademarks)	11. Customer loyalty (Customer retention, Customer service, Customer support, Market share)	19. Level of education (GCSE, Diploma, Degree)
4. Management philosophy (Management philosophy)	12. Distribution channels (Distribution channels)	20. Vocational qualifications (Work related qualifications, Professional qualifications, Certificates, Experience in industry)
5. Corporate culture (Leadership Communication)	13. Business Collaborations (Partnerships and joint ventures)	21. Training and development (Work-related knowledge, Work-related competencies)
6. Management processes (Company capacity, Improvements in the business model, in functional distribution, in communication network, in efficiency of labour, capital and structural applications and in speed of process, Effective quality management procedures for product & service)	14. Licensing agreements (Licensing agreements)	22. Entrepreneurial spirit (Diversity of educational backgrounds [scientific or non-scientific], Innovation and venturing activities, New/radical products, services or Processes, Joint ventures, Outright purchase or Greenfield investment)
7. Information systems (Technological systems, Web transactions, Computer software and operating systems, Networking systems, Electronic data interchange, Telecommunication infrastructure)	15. Favourable contracts (Contracts for the supply of services, goods, capital and labour)	23. Innovativeness (Innovativeness, Proactive and reactive abilities, Changeability, New ground breaking production methods, New service or processes, New software, patents, ventures or developments)
8. Financial relations (Suppliers of capital, Suppliers of supplies and services, Suppliers of labour, Regulations and inland revenue)	16. Franchising agreements (Franchising agreements)	

Source: Adapted from Brooking (1996), Ch'ang and Yastreboff (2003, p170), Guthrie (2001, p35), Guthrie and Petty (2000), Abeysekera (2001), IFAC (1998), the Australian Society of CPAs and the Society of Management Accountants of Canada (1999), Stewart (1997) and Sveiby (1997).

in the coding exercise are summarised by Beattie and Thompson (2006, p.6). The ICF adopted by this research encompasses 23 IC attributes grouped into the three IC categories of SC, RC and HC as summarised in Table 3.2.

Firstly, to attain the requirements of accuracy, reproducibility and stability as suggested by Krippendorff (1980), this research defines the parameters within which the content analysis is conducted. The complete annual report was read first before coding commenced in order to obtain an initial overview of the annual report. The coding was conducted on all areas of the annual report including voluntary narrative and non-narrative disclosures included in the financial statements. The limitations and exclusions included areas of mandatory disclosure in particular the financial statements that provide mandatory quantitative disclosures and that are audited to ensure compliance with regulations.

Secondly, no differentiation is made, between completed R&D projects such as patents and ongoing intangible generation projects such as new R&D developments and activities, in the coding process and in identifying the disclosure or not of an IC attribute. Within this research, both established and developing IC indicates the presence of potential for future earnings. Furthermore, R&D activity applied to create IP such as patents or new products increases the potential of future earnings. As these resources have the ability to increase growth, management's objectives in signalling these IC attributes may illustrate value not disclosed in traditional financial statements. Nevertheless, patents rather than R&D activities can be immediately applied in generating value as these investments may be at various stages of IC development, each providing different growth prospects. Although intellectual liabilities are not considered in this research, this research acknowledges that no IC disclosure in itself may be considered a liability given the necessity of innovation and technology in the new knowledge economy and given the market's adverse reaction to no news. With respect to DI, this research acknowledges the presence of IC whether developed or developing as the presence of an IC attribute. With respect to WDI however, recognition of an ICCA attribute is dependent on the completion of the development process whether training leading to HC qualifications or R&D leading to IP structures or customer relations leading to increased market share. In addition, in all cases the

identified, developed and implemented IC should lead to a competitive advantage in the market place. Furthermore, management should be actively maintaining the IC in a manner that confirms the importance of the attribute as generating competitive advantage. This maintenance may take the form of a dynamic organisational process to manage, develop, maintain and report IC.

According to Holsti (1969), a recording unit is “the specific segment of content that is characterised by placing it into a given category” within the text. Zeghal and Ahmed (1990) indicate that words are the smallest unit of measurement for analysis and may provide a robust measure in quantitative terms. This research however acknowledges that individual words may not convey the meaning of the disclosure in particular with respect to ICCA attributes, as such word counts may be considered appropriate for the measurement of amount of space or percentage of words dedicated to IC but not indicative of the quality of the disclosure. Milne and Adler (1999) suggest that sentences are the most reliable unit of analysis. However, sentences may signal the existence or competitive advantage of more than one IC or ICCA attribute. Furthermore, sentences may differ in size and as such may result in the loss of one or more IC attribute in the coding exercise. Due to the nature of the definition of an attribute as discussed above, individual words or sentences are therefore not applied as the recording unit. The variable nature of IC disclosures is such that a comprehensive analysis would need to capture all manner of IC attribute disclosure including phrases, sentences, groups of words, pictures, diagrams and graphs, as individual words are deemed insufficient to meet the requirements of an ICCA or IC attribute.

Davison and Skerratt (2007) concur that discretionary words (IC attributes) and pictures and diagrams (brands, licenses, patents, efficiency certificates, awards, IC attributes, HC certificates) are being used to communicate business intangibles such as; corporate activities not covered by traditional accounting, products, management, markets, business development, customers, employees, future aspirations, corporate responsibility and brands. As such with respect to narrative disclosures, consistent with the approach applied by Beattie *et al.* (2004, p.32), this research splits sentences into text units with each group of words able to meaningfully convey independently, a single IC or ICCA attribute. With respect to non-narrative disclosures,

consistent with the suggestions of Davison and Skerratt (2007, p.9) and Unerman (2000), the use of narratives alone will capture only the partial disclosures. This research therefore includes other visual forms of communication that have been found to provide an immediate and effective means of corporate disclosure (Beattie and Jones 2001 and Beattie and Thompson 2006). Davison and Skerratt (2007) provide evidence that within the top 100 UK companies, 94% of pictures communicated intangible aspects of companies businesses.

Thirdly, as illustrated in Table 3.2 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 and Bozzolan *et al.* 2003). Various authors have applied a different number of IC attributes in their studies. IFAC (1998) in a study on measurement and management of IC applied a 30 IC attribute framework, Ch'ang and Yastreboff (2003, p.170) in a study on types of IA applied 12 IC attributes, the Australian Society of CPAs and the Society of Management Accountants of Canada (1999) applied 37 IC attributes, Abeysekera (2001) applied an IC framework of 43 attributes. Nevertheless, by far the most common framework originates from the work of Sveiby (1997, p.12) and developed by Guthrie (2001, p.35) that applies a framework of 25 IC indicators. Guthrie and Petty (2000), Brennan (2001), April *et al.* (2003) and Bozzolan *et al.* (2003) all applied this framework. Milne and Adler (1999) suggest that as the number of content categories increases, the potential for coding errors increases. Conversely, as the number of categories decreases, the likelihood of random agreement in coding decisions increases. As such bearing the importance of comparison and replicability, this research defines the 23 IC attributes as illustrated in Table 3.2 as representative of an equilibrium point that ensures limited coding errors and limited random agreement.

Fourthly, to ascertain that the scoring was consistent and accurate according to the chosen scoring procedure a verification test was carried out by three researchers from the field in a similar process as that conducted by Guthrie and Petty (2000). Twenty annual reports were randomly selected, scored, compared and correlated. Twenty annual reports out of the total of 488 or 1 out of every 25 were verified and agreed by three independent persons. Explanatory notes on each ICCA and IC attribute and examples of specific

ICCA and IC disclosures in practice were discussed before the start of the analysis consistent with Bozzolan *et al.* (2003). The ANOVA test for variance illustrated significantly similar objectivity after 20 annual reports had been coded. The results of the 20 companies pre-tested provided significant evidence of consistency in the coding process. This consistency is important to ensure the content analysis stage of this research gives each ICCA and IC attribute in any annual report, an equal chance of selection if it meets the criteria.

Fifthly, the importance attached to the manner of disclosure of each IC attribute disclosure may vary based on the objectives of the analysis. The frequency of disclosure, the size of the font, the location of disclosure and other variables too may reflect the emphasis of the disclosure. However, the overriding focus of this research in DI is to establish the existence of IC attributes particularly as prior studies have indicated a lack thereof. As such, multiple disclosures, large font disclosures and location characteristics are not considered in this context; secondly, with WDI, the manner of disclosure is analysed and the emphasis of the manner is in the competitiveness of the disclosure. This competitiveness is evident in the content of the disclosures as opposed to the manner of the disclosure.

This factor gives rise to the decision to weight the attributes within WDI given that different IC attributes are of different importance to different users. Following Cooke (1989), it was decided to weight the IC attributes in order to take into account differences in competitive advantage in terms of depth of IC disclosure in the annual report. This research utilises this competitive advantage scoring procedure by developing a new index construct. Therefore, the limitations imposed by the objectives of DI that investigates only the existence or not of IC attribute disclosure may be mitigated by WDI. 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, a quality adjusted content analysis method in which disclosures are counted and weighted to identify their likely significance, may be more appropriate (Beattie and 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. Wallace (1987) suggests that as attributes have different levels of importance to different users the scoring method may be based on a hierarchy of weights. The weights may be subjective as was done by Singhvi and Desai (1971), may be a replication of weights used by a previous researcher (Barrett 1977) or may be based on the ranked order of preference derived from user perceptions (Buzby 1974).

Table 3.3 Index Construction Methods

	UNWEIGHTED	WEIGHTED
DICHOTOMOUS	Copeland and Fredricks (1968)	Singhvi and Desai (1971)
	Spero (1979)	Buzby (1974)
	Chow and Wong-Boren (1987)	Barret (1977)
	Wallace (1987)	Firer and Meth (1986, cited by Meek and Gray 1989)
	Cooke (1989)	Chow and Wong-Boren (1987)
	Gray and Haslam (1990)	Wallace (1987)
	Cooke (1993)	Malone <i>et al.</i> (1993)
	Hossain <i>et al.</i> (1995)	Wallace <i>et al.</i> (1994)
	Meek <i>et al.</i> (1995)	Prencipe (2004)
	Owusu-Ansah (1998)	
	Alsaeed (2005)	
QUALITATIVE	Wiseman (1982)	Buzby (1975)
	Giroux (1989)	

Source: Appendix 1A

Table 3.3 shows some of the weighting procedures which have been adopted in past studies. Table 3.3 is intended to be indicative rather than

exhaustive since there have been many studies that have used different weighting systems. Further, this review of the literature enables the justification of the application of a weighted DI. The studies in Table 3.3 are categorised according to whether the index items are weighted or unweighted and whether the items are evaluated dichotomously or according to the quality of individual disclosures. Table 3.3 reveals that 20 of the 23 indices used a dichotomous rather than a qualitative approach in recognising the disclosure of the items and 13 of the 23 indices have used an unweighted system.

This research applies both DI and WDI to determine if weighting substantially influences the results. This research may thus confirm or contradict the findings by both Wallace (1987) and Cooke (1989). The competitive advantage weighing scheme applied in this research, accounts for the proactive identification, development, management and utilisation of the IC attributes disclosed. Once all the annual reports had been scored, an index was created to measure the relative level of voluntary disclosure by each company. The index is the ratio of the actual scores awarded to a company to the maximum possible score that that company is expected to earn. Overall, the score for a company is additive:

Where: X_{ij} = "2" if *i*th attribute bears a competitive advantage, is comprehensive and illustrates the quality of IC is disclosed
 "1" if *i*th attribute is disclosed,
 "0" if *i*th attribute is not disclosed

So that given that: $0 \leq I_j \leq 2$ (1)

X_{ij} = expected item of disclosure
 n_j = "23" the number of items in the voluntary disclosure list
 n_j = number of actual attributes disclosed for the *j*th company
 $n_j \leq$ "23"
 $m_j \leq$ "46" if $I_j =$ WDI
 "23" if $I_j =$ DI

So that $n_j \leq m_j$

The maximum possible score (n_j) a company can earn varies. In the first instance with respect to IC, its development, management and maintenance and

in the second, with respect to ICCA, its unique product, service, process, IP, relationship or human resource that cannot be replicated by competitors. This is the first time that such an index is constructed within the IC literature. The coding was conducted by the researcher. Disclosure illustrating a competitive advantage earned a score of “2” under WDI and earned a score of “1” under DI. In both cases, no disclosure earned a score of “0”. The disclosure for each company is calculated as follows for WDI the competitive advantage index:

$$I_j = \frac{\sum_{i=1}^{n_j} X_{ij}}{m_j} \quad (2)$$

where:

I_j	WDI
n_j	number of actual attributes disclosed for the j^{th} company
$n_j \leq$	46
$m_j \leq$	46
$n_j \leq$	m_j
X_{ij}	“2” if i^{th} attribute disclosed illustrating a competitive advantage “1” if i^{th} attribute disclosed, “0” if i^{th} attribute not disclosed

so that $0 \leq I_j \leq 2$

In order to compete successfully, competing firms must hold some form of competitive advantage. This may be assessed if companies adopting an industry competitive strategy disclose stable local sources of tangible and intangible capital, materials, labour and customers, or have plans in place to obtain such resources. This competitive strategy is translated into ICCA attribute disclosures by the signalling of a unique product, service, process, IP, relationship or human resource particularly as the ICCA cannot be replicated due to barriers to imitation that may provide protection from loss through proprietary costs. Clulow *et al.* 2003 explains that a company is said to have a competitive advantage when it is implementing a value-creating strategy not simultaneously being implemented by any current or potential competitors. This competitive advantage is sustainable if the advantage resists imitation by

competitor behaviour (Bharadwaj *et al.* 1993). The disclosure for each company was calculated as follows for DI the unweighted index:

$$I_j = \frac{\sum_{i=1}^{n_j} X_{ij}}{m_j} \quad (3)$$

where:

$$\begin{aligned} I_j &= \text{DI} \\ n_j &= \text{number of actual attributes disclosed for} \\ &\quad \text{the } j^{\text{th}} \text{ company} \\ n_j &\leq 23 \\ m_j &\leq 23 \\ n_j &\leq m_j \\ X_{ij} &= \text{"1" if } i\text{th attribute disclosed,} \\ &\quad \text{"0" if } i\text{th attribute not disclosed} \end{aligned}$$

So that $0 \leq I_j \leq 1$

Hayton (2005) argues that IC offers a unique source of advantage that facilitates entrepreneurship by reducing the risk and increasing the returns from investments in innovation and venturing activities. Attainment of competitive advantage may be high risk but may be associated with higher returns when successful. There is a statistically significant relationship between different sources of competitive advantage and IA. SC is a major source of competitive advantage (Flamholtz and Hua 2003). As the traditional barriers to imitation collapse and as tangible assets and resources offer decreasing competitive advantage, many organisations have had to turn to SC such as patents, brands and organisational or process knowledge. To mitigate the expected lack of depth in disclosure, only one IC attribute, "company names" is regulated; therefore measuring the depth of these IC attributes is enhanced by the lack of regulation as companies have more discretion in choosing a disclosure policy within the parameters of the ICF of this research. No penalties were imposed if an attribute was judged not to be relevant (Haniffa and Cooke 2002). To ensure that judgement of relevance was not biased, the entire annual report was read before any decision was made (Cooke 1992 and 1996).

Nevertheless, more and more evidence is emerging in the literature on the notion that there is little if any significant difference between weighted and unweighted disclosure indices (Spero 1979 and Chow and Wong-Born 1987).

However, as part of the original contribution of this research, the opportunity of identifying such a difference exists largely due to the relationship between competitive advantage and IC.

3.1.4. Research Methodology

This section discusses the statistical methods that are applied. Empirical studies have been widespread, ranging from mandatory to voluntary, from international to industry specific, from social and environmental to IC however, in all cases theoretical applications have enabled the explanation of management behaviour with the use of various hypotheses. Various explanations have been advanced to justify why a company may disclose more IC than just mandatory information. There has been extensive research on empirical work relating to corporate characteristics and their association with voluntary disclosure practices. In this research, a decision was made on the statistical methods that would be applied in testing the impact of the corporate characteristics on VDIC.

An examination of the complete data in this research determined that some independent variables are not normally distributed and are transformed according to the methodology followed by Cooke (1998). Various methods are applied to resolve statistical problems due to non-normality of the data. The understanding in the literature is that not all empirical relationships are linear. Empirical tests commonly applied in the literature, parametric tests and non-parametric tests (Nachmias and Nachmias 1976) have indicated that each type of statistical procedure depends on the data meeting certain conditions. In addition, influential observations may have inferential significance in the distribution of the sample.

The data set in this research is both leptokurtic and in some cases positively skewed. These two issues necessitate thorough data analysis before empirical tests are carried out. Two potential methods of transforming data include the rank regression approach and the normal scores approach. These transformations are necessary when residuals are not normally distributed. In order to understand the data, several quantitative and qualitative analytical tools are applied to provide descriptive statistics of the data, including descriptive statistics of the dependent and independent variables. Based on this analysis, it

was established that the data is not normally distributed. Further analysis of the descriptive statistics and tests for association and collinearity revealed the extent of non-linear monotonic relationships, revealed the extent of skewness, kurtosis and heteroscedasticity justifying the data transformation conducted in this research.

Linear models (Beaver *et al.* 1979 and Cheng *et al.* 1992) have become more complex and now incorporate some of the data transformations included by Cooke (1998). These statistical procedures favour transforming the data as one option, and applying rank regression as another, rather than applying the conventional Ordinary Least Squares (OLS) regression without statistically accounting for non-normality (Lang and Lundholm 1993, Wallace *et al.* 1994, Wallace and Naser 1995 and Lang and Lundholm 1996). In addition, to mitigate the effects of influential observations on the regression statistics, this research suggest two approaches linked to Cooke (1998). The first, estimates a rank regression that assigns equal weight to all points in a data set whether it is influential or not (Iman and Conover 1979, p.502). The second approach is to remove the influential observations from the data set.

This research adopts Cooke's (1998) approach that includes data transformations; when the relationship is a monotonic function of DI and WDI and non-linear in nature, this research controls for this problem by transforming variables without using ranks but by applying terms of powers, roots and logs (Roberts and Gray 1988, cited by Meek and Gray 1989). As the error term is normal and independent, the *F*-statistic can be used since large *F*-values suggest linearity. As this research indicates, there is no need to exclude outliers, as the monotone non-linear relationships do not persist (Cooke 1998). In addition, the dependent variable DI and WDI is a metric ratio and can be transformed where necessary before statistical tests are applied. In addition, to satisfy the econometric assumption that the distribution of the dependent variable should not be constrained to be between "0" and "1", DI and WDI are transformed. Furthermore, sensitivity tests are conducted, the first compares DI and WDI; the second compares the results of the OLS linear regression with results of the quantile regression and the third generates industry dummy variables in assessing the robustness of the results. Tests for heteroscedasticity and skewness are applied and variables are transformed by applying terms of

powers, roots and logs before a robust OLS regression is estimated. The second sensitivity test assesses the sensitivity of the results to the OLS regression that are associated with non-normal residuals, this research applies quantile regression, that is expected to report similar or better results. This sensitivity test assumes a Poisson distribution of WDI given the possibility that WDI could be discrete and not continuous. The results of these sensitivity tests are presented in Chapter 8.

3.2.0. Model Development

This section discusses the selection of the statistical model, the inclusion of each independent variable and its respective proxy in each of the models. The model is motivated by the four focal areas of this research; investment in IC, financial risk measures, industry membership and corporate governance mechanisms as indicated in the analytical framework, Table 2.1. Secondly, on prior voluntary and mandatory disclosure studies as reported in Tables 2.4 and Appendix 1A. Generally, size and growth have been associated with VDIC. Thirdly, variables selected are expected to differentiate between IC and tangible measures so that the influence of IC can be accounted for in the variation of VDIC.

Three proxies of size are examined, MV, TA and SALES to differentiate between intangible and tangible assets and to differentiate the effect of the different size proxies on VDIC. Industry classifications are based on increasing complexity that is based on innovation and technology. Two “hidden value” proxies MVBV and MVTA are included consistent with identification of the effect of variations of book value and total assets on VDIC in the presence of variation in MV. Fourthly, examination of the descriptive analysis and the collinearity tests between the dependent and the independent variables ensures that correlated independent variables are not included in the same model.

Furthermore, motivations for the inclusion of each of the variables in each model are discussed in sections 3.2.1 to 3.2.5. This strategy has, however, been criticised by Wallace and Naser (1995) who argue that it is better to begin the analysis with those variables which have frequently been proven by

previous studies to be predictors of disclosure indices. However, as the literature review has indicated only a few variables are examined in IC studies and very few theories have been applied in these studies. As such, the development of the variables for each model follows a hierarchy of importance as indicated above that begins by a focus on the four areas identified as potentially influencing VDIC and consistent with the research objectives. Their particular relevance to IC has resulted in their selection ahead of other categories of company characteristics.

3.2.1. Model I: Investment in IC

IC investment is generally accompanied by increased VDIC, as companies signal their superior IC generating capabilities. Model I determines whether the benefits of VDIC are perceived as outweighing proprietary costs and whether a maximum disclosure policy may be maintained, consistent with research objective 1.1.2 (a). Generally, Model I is associated with the RBV and signalling theory as companies with high levels of IC investment are expected to have higher levels of VDIC as they differentiate themselves from their competitors. The main components of IC investment as defined in ICF comprise HC, SC and RC.

The selection of variables included in Model I has initially been motivated by identifying a representation of the constituents of SC, RC and HC in the financial statements. Few financial measures of IC content are reported in companies' financial statements as such, there has been no option available for the researcher in selecting IC investment proxies to include or exclude from Model I. The main reason attributable for this lack of quantitative measures is the complexity of identification, measurement, title and control that has been illustrated by the literature. Furthermore, this complexity has been compounded by the lack of regulations on IC disclosure as illustrated by the VDF that too has been attributed to these issues surrounding IC's intangible nature, ownership issues, competitive costs and replicability. This model investigates financial measures of IC investment, EMPC (HC), R&D (SC), TMRK (SC) and MANUF (SC). Table 2.1 illustrates that the lowest levels of disclosure are illustrated by a lack of investment in IC and a lack of IA in the resource base.

The empirical form of Model I including a summary of defined variables is set out below:

$$WDI = \beta_0 + \beta_1 EMPC + \beta_2 R \& D - \beta_3 MANUF + \beta_4 TMRK + \beta_5 SIZE + \varepsilon \quad (4)$$

where

β_0	:	intercept;
$\beta_1 - \beta_5$:	coefficient of slope parameters;
ε	:	error term.

Dependent Variable:

WDI: weighted disclosure index based on disclosed ICCA attributes measured as a square root transformation.

Independent Variables:

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);

R&D: ratio of research and development to sales turnover;

MANUF: manufacturing or non-manufacturing;

TMRK : the TechMARK listing.

Control Variable:

SIZE: market value is the share price multiplied by the number of ordinary shares in issue measured as a log-transformed variable.

The dependent variable is represented by WDI, the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. EMPC is taken from *DataStream* and represents the ratio of staff cost to number of employees. R&D is defined as research and development expenditure. MANUF is a dichotomous variable that differentiates between manufacturing and non-manufacturing based on primary economic activity of each company; this variable is obtained from the annual report. MV is obtained from *DataStream* and is defined as share price multiplied by the number of ordinary shares in issue. TechMARK listing is a further industrial classification that is based on technologically innovative processes. The variable is obtained from the LSE TechMARK listing. Companies investing in IC however, are expected to have higher levels of “hidden value” and as such may disclose more IC. Furthermore, management of these companies may be expected to signal the existence of IC particularly

when they operate in complex sectors whilst conducting technologically innovative operations.

In this model, MV is applied as the size variable. The existence of various IC attributes including HC, SC and RC has been attributed with an increase in the MV of firms. Increasing labour intensity or reduced staff turnover may signal good practice within HC, enhancing the MV of firm. Investment in IP may be associated with higher levels of applications, citations and references with respect to patent and other IP (SC), that are associated with higher MV and stock returns for technology and science-based companies (Deng *et al.* 1999). In addition, companies that generate innovative technology are likely to benefit from important inventions and successful products (Gelb and Siegel 2000). These products may provide a competitive advantage if they provide returns that exceed those of competitors. Such a competitive advantage can be developed where barriers to imitation either financial, technical, market or legal prevent or delay the entry of competitors. These first mover advantages are attributed to time delays in high-tech industries that may permanently affect any such entry particularly where the industries are based on rapidly developing technologies. These advantages may also be attributed to the RBV due to the nature of IC, being inimitable and difficult to replicate. A few studies have investigated the effect of disclosure on MV.

Lang and Lundholm (2000) report that companies with increasing levels of disclosure experience significant price increases these increases are attributed according to Healey *et al.* (1999) on investors upwards revision of their valuation of a company's shares. The inclusion of SIC and MANUF control for industry reporting trends, tangible or intangible investment in operations. Model I includes MV as a size proxy. The classification of the industry proxies applied in this model is based on IC content. Industries with higher levels of SC, RC and HC are expected have higher levels of VDIC.

3.2.2. Model II: Financial Measures of Risk

Model II focuses on measures of risk as the independent variables in compliance with research objective 1.1.2 (b). From a theoretical perspective, Model II is associated with the financial measures of risk that may be

associated with agency theory in line with the minimal disclosure of IC. Performance measures include liquidity that may be associated with signalling theory. Agency theory on the other hand proposes an explanation based on reduced VDIC as a means of withholding potential damaging information from stakeholders. Companies that are endowed with substantial IC may tend to have higher market risk and may be subject to a higher degree of asymmetry (Aboody and Lev 2000, p.2749). Chan *et al.* (2001) and Van der Meer-Kooistra and Zijlstra (2001) found that the lack of VDIC caused investors' risk perception to increase, in addition a lack of information about IC investments could lead to conservative estimates of future earnings. Coles *et al.* (1995) suggest that assessing the risk attached to equities may be influenced by the company's beta factor (BETA); the perceived risk and uncertainty may be greater for companies with high R&D activities, particularly where such activities result in the creation of value through SC, RC and HC. The communication of this value is not easily achievable due to the inherent nature of IC, leading to uncertainty over the existence and growth potential of a company.

The variables included in this model comprise three variables of financial, liquidity and market risk represented by gearing (GEAR), liquidity (LQD) and (BETA). Control variables in this model include size as measured by total assets (TA), growth (GRWT), industry (SIC) and "hidden value" variable MVBV. Agency and signalling theory are applied in the development of the risk hypotheses. The inclusion of TA as the proxy for the size variable investigates the effect of tangible asset based companies on VDIC. A comparative review is conducted with MV as a size proxy and SALES as a size proxy in different models. TA does not account for the IC in the equity of the company whereas MV and turnover are expected to represent the value and proceeds of all tangible and intangible assets respectively. SIC controls for the variation in VDIC that may be attributed to the variation in industry reporting trends. The model includes a measure of "hidden value", MVBV that determines the influence of risk on VDIC of companies associated with varying levels of intangible value.

To provide a basis for selecting variables to include in the risk model, reference is made to the literature review in identifying associations identified

in the past. The association of risk and disclosure has been generally insignificant with Garsombke (1979) finding no significant association between various measures of risk and disclosure. This study identified the lack of a logical theoretical base in previous studies by Singhvi and Desai (1971) and Kochanek (1974). The results indicate that the measure of risk applied and the lack of control on other variables may account for the relationship found. In an ancillary study, although Beaver *et al.* (1970) found that earnings variability, dividend payout ratio, earnings beta and gearing showed consistently significant correlations with systematic risk, Firth (1984) produced no significant association between disclosures in general and the level of equity risk in the UK. This result for the UK suggests that components of equity risk may not be associated with disclosure; furthermore, greater amounts of disclosure may be of use to stakeholders, however these disclosure levels are not motivated by the market's need to assess current and future levels of systematic and other risks (Firth 1984).

In contrast, the informativeness of increased disclosure is confirmed by Gelb and Zarowin (2000) who found that greater disclosure is associated with stock prices that are more informative about future earnings and therefore that greater disclosure provides information benefits to investors. The varying results are due mainly to the different definitions of risk; Abdelghany (2005) provides an analysis of the association between various accounting measures of risk and BETA, the market risk that measures the systematic, undiversifiable risk in companies. As BETA is dominated by share price fluctuations, this measure is traditionally taken as the market determined risk measure (Abdelghany 2005, p.869) and within the context of pricing models, is a measure of unavoidable or systematic risk associated with investment in a company. Beaver *et al.* (1970) conclude that seven accounting measures capture most of the important relationships suggested in the literature and may be categorised into financial risk, business risk and systematic risk.

The analytical framework in Table 2.1 sets out the expectations raised by the model and the theoretical approach applied. At lower levels of risk, companies are expected to provide moderate IC disclosure. However, as firm specific risk increases, management may reduce the level of IC disclosure in accordance with agency theory predictions as they protect their interests. In

contrast, an increase in market risk may be expected to result in an increase in IC disclosure as management reduce information asymmetry through signalling IC information and through the reduction of uncertainty. Nevertheless, the determining factor is found in the constitution of the resource base and the higher risk attached to a dominantly IA resource base.

To address these categories, this research examines financial risk as being associated with the financial structure of the company. The risk is expected to arise from the gearing ratio and the liquidity ratio. Both these accounting measures have been associated with BETA. Grinblatt and Titman (1989) indicate that a positive association exists between GEAR, BETA and LQD. However, although traditionally BETA is expected to be inversely associated with LQD, Farrelly *et al.* (1985, p.282) argues that larger and more financially secure firms may maintain lower levels of liquid assets because of easy access to lines of credit and to the market for commercial paper that is able to satisfy their liquidity requirements.

Business risk is associated with the probability of losses arising from the operations of the company including product markets and input costs (Abdelghany 2005). Systematic risk however, is the probability of losses arising from forces that occur broadly within the economy. These forces affect a larger number of companies (Abdelghany 2005) and the risk attributed to their influence may be represented by BETA. The three accounting measures expected to capture earnings fluctuation characteristics are earnings variability, earnings growth and dividend payout. Thus in his study, Abdelghany (2005), confirms a significant association between market risk and total assets, current ratio, earnings growth variable and dividend payout. Given the close association of these accounting measures of risk with the market measure of risk, this research identifies the importance of including these measures in evaluating the hypothesised influence of financial risk measures on VDIC. Non-significant variables identified by Abdelghany (2005) include covariance of earnings, standard deviation of earnings-to-price ratio and debt to TA. GEAR is associated with the financial structure of the company and therefore the cost of capital. It is expected that the cost of capital would be generally higher for companies with higher systematic risk.

Botosan (1997) and Sengupta (1998) suggest that market risk (systematic risk or BETA) is an essential determinant of cost of capital and VDIC may be one way of mitigating such risk. Lower VDIC results in less information available and therefore market risk may increase resulting in the higher cost of capital. The sum of systematic and unsystematic risk provides the total market risk of equity in addition the sum of business and financial risk provides the total company risk. The empirical form of the model and a summary of defined variables are set out below:

$$WDI = \beta_0 + \beta_1 BETA - \beta_2 GEAR + \beta_3 LQD + \beta_4 SIC + \beta_5 GRWT + \beta_6 MVBV + \beta_7 SIZE + \varepsilon \quad (5)$$

where

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

Dependent Variable:

WDI: weighted disclosure index based on disclosed ICCA attributes measured as a square root transformation.

Independent Variables:

BETA: systematic risk as measured by a company's beta factor;

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;

LQD: quick assets ratio.

Control Variables:

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

GRWT: compounded five-year annual sales growth rate;

MVBV: market value to book value ratio;

SIZE: TA representing the sum of tangible fixed assets, intangible assets, investments (including associates), other assets, total stocks & WIP, total debtors & equivalent and cash & cash equivalents is measured as a log transformed variable.

Thus, in Model II the dependent variable is represented by WDI the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. BETA is taken from *DataStream* and is a measure of systematic risk. It relates

movement in a company's share price to movement in the market. Over a period it expresses the relative movement of the price against the market, showing the likely relative change for a given market movement and whether the stock is prone to under- or over-react. GEAR is defined as the ratio of debt to equity and is obtained from *DataStream*. LQD is defined as the quick assets ratio and is taken from *DataStream*. GEAR and LQD are proxies for financial risk. SIC is the industry classification that is based on economic activity. This classification is obtained from *DataStream*, as is MVBV that is defined as the ratio of market capitalisation to book value. GRWT is the variable that is associated with companies that generate IC including new projects and services and is based on a five-year compounded sales growth rate. Sales data is obtained from *DataStream*, as is size that is defined as TA representing the sum of tangible fixed assets, intangible assets, investments (including associates), other assets, total stocks and work in progress (WIP), total debtors & equivalent and cash & cash equivalents.

3.2.3. Model III: Industry Membership

Model III introduces several recognised industry membership classifications consistent with research objective 1.1.2 (c). As the classification of each proxy for industry-membership is based on technological innovation and complexity, the variation in the level of VDIC is expected to be positively associated with the variation in industry classification. Companies in industries associated with higher levels of SC, RC and HC are expected to disclose higher levels of IC. The motivations for Model III are therefore based on the RBV and signalling theory and the benefits of disclosing superior qualities and competitive advantage evident in industries with high growth opportunities. The literature reports that disclosure may vary by economic sector. Mitchell *et al.* (1995) found that financial information disclosure was industry specific; furthermore, Inchausti (1997) and Ferguson *et al.* (2002) suggest that some industries have more voluntary disclosures.

To determine the influence of the different industry classifications, TMRK, MANUF, INDG and SIC, the model controls for size as measured by SALES given that all assets whether tangible or intangible and in any industry

are applied in generating turnover. The motivations of inclusion of these particular industry classifications is their foundation in measuring business operations on a continuum ranging from low IC content to high IC content (SIC and INDG) and on a dichotomous scale differentiating between IC and no IC content (TMRK and MANUF). In Model III, the proxy for size is SALES thus enabling a comparative analysis with the results of size as measured by TA and MV in Models I and II respectively. It is important to examine the consistency of the results of the same variables included in different models. An assessment of the changes on the results of size, TMRK, MANUF, SIC and GEAR in their association with VDIC for different models can be conducted.

The literature has illustrated that industry membership has been identified as a potential explanation of accounting and disclosure policy choice (Watts and Zimmerman 1986 and Whittred and Zimmer 1990). The “bandwagon” effect may apply to each industry as companies may adopt particular reporting characteristics within their industries, over and above those regulated for all industries by law (Inchausti 1997 and Ferguson *et al.* 2002). Cooke (1989) pointed out that leading companies in an industry might motivate other companies therein to match their level and quality of disclosure. Furthermore, the demand for IC disclosure is greater for companies that operate in industries where the variability of the future is higher and the ability to forecast results is more difficult. This is especially the case in high tech-industries (Robb *et al.* 2001, Bozzolan *et al.* 2003, Patten 1991 and Roberts 1992). Further, higher disclosure may be expected of companies in political sensitive industries such as oil and gas (Whittred and Zimmer 1990), manufacturing (Cooke 1992) and those in highly regulated industries (Ng and Koh 1993). Verrecchia (1983) suggests that voluntary disclosure policies may differ across industries due to competitive and political costs. Industry has been found to control for these costs in voluntary disclosure studies.

This research identifies four potential ways in which industry membership may influence the level of VDIC. Industry membership of the LSE TMRK, membership of a manufacturing sector MANUF, membership of an industry group INDG and SIC constitute the four ways of differentiating industries as selected for this research. The analytical framework on industry is illustrated by Table 2.1 and is applied to Model III; increasing complexity and

increasing innovative activities are consistent with increasing non-manufacturing, increasing SIC code, increasing INDG codes and listing on the TMRK. As such higher levels of IA in the resource base are expected to lead to IC disclosure. The empirical form of the model and a summary of defined variables are set out below:

$$WDI = \beta_0 - \beta_1 GEAR + \beta_2 MVTA + \beta_3 INDG - \beta_4 MANUF + \beta_5 SIC + \beta_6 TMRK + \beta_7 SIZE + \varepsilon \quad (6)$$

where

- β_0 : intercept;
- $\beta_1 - \beta_7$: coefficient of slope parameters;
- ε : error term.

Dependent Variable:

WDI: weighted disclosure index based on disclosed ICCA attributes measured as a square root transformation.

Independent Variables:

INDG: this data type returns the DataStream level 6 industrial classification number;

MANUF: manufacturing or non-manufacturing;

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

TMRK : the TechMARK listing.

Control variables:

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;

MVTA capital productivity; market value to total assets;

SIZE: net sales or turnover represent gross sales and other operating revenue less discounts, returns and allowances, measured as a log-transformed variable.

In Model III, the dependent variable is represented by WDI the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. INDG is taken from *DataStream*, and is an industry classification based on six industries. MANUF is a dichotomous variable that differentiates between manufacturing and non-manufacturing based on primary economic activity of each company; this variable is obtained from the annual report. SIC is the

industry classification that is based on economic activity. This classification is obtained from *DataStream*, as is SALES the proxy for size in this model and is defined as gross sales less discounts. TechMARK listing is a further industrial classification that is based on technologically innovative processes. The variable is obtained from the LSE TechMARK listing. MVTA is taken from *DataStream*; it represents the ratio of value attributed to shareholders to total assets. GEAR is defined as the ratio of debt to equity and is obtained from *DataStream*.

3.2.4. Model IV: Corporate Governance Mechanisms

Model IV places emphasis on corporate governance mechanisms as the independent variables in compliance with research objective 1.1.2 (d). Corporate governance mechanisms are linked with the control of agency costs and the separation of principle and agent as such Model IV is associated with agency theory. As agents, management have significant influence over the disclosure decision. Nevertheless, conflicts of interests between the agent and principle may result in the agents pursuing their own interests due to asymmetric information. Furthermore, with the increase in markets, the shareholder base may be expected to increase resulting in additional agency costs. Management of disclosure policy is likely to be influenced by governance mechanisms (Healey and Palepu 2001) that are implemented to promote an optimal disclosure policy (Shleifer and Vishny 1997).

Corporate governance has emerged with the development and growth of the modern corporation, originating in the separation of ownership and control in the modern company. Today, certain imperfections are recognised regarding this legal construct in particular that no agent is directly responsible for the actions of the company. This has resulted in the identification and aggregation problem in which we find that companies have rights but no responsibilities. This separation of ownership and control has culminated in the agency problem (Berle and Means 1934), asymmetric information and differential shareholder rights with the exclusion of other stakeholders, profit maximisation as the dominant company objective. These views prevail in the conservative finance theory and the link to neo-classical economic and political doctrine. The

increased frequency of scandals, the increased reporting of their incidence has only confirmed the problem as it has existed throughout the development of company law. The response by the contemporary corporate governance movement is associated with a wave of corporate governance and social responsibility codes. Several codes have been proposed, a list of some of the codes that apply to the UK are listed below:

- Cadbury Committee (1992) UK
- The Rutterman Report (1994) UK
- Greenbury Report (Hughes 1996) UK
- The Turnbull Report (1999) UK
- Combined Code (FRC 2003) UK

These codes examined amongst others monitoring mechanisms, the disproportionate ratio of executive directors to NONEXEC, ethical and remuneration rights, financial reporting, audit committees, shareholder rights and corporate social responsibility reporting. Further codes grounded in moral and ethical foundations include the following that impact on UK listed companies:

- Organisation for Economic Cooperation and Development (OECD) Guidelines on Multinational Enterprises (1976)
- The United Nation's Global Compact (1999)
- Global Sullivan Principles (Sullivan 1999)
- The Global Reporting Initiative (2000)

Overall, these codes emphasise voluntary compliance and only rarely impose penalties, as there is little if any link with concrete legal requirements. Mandatory requirements may be waived at times if adequate explanation is provided reported on by external auditors. Contemporary definitions refer to corporate governance frameworks that encourage the efficient use of resources, require accountability and stewardship for those resources and align the interests of individuals, corporations and society (Sir Adrian Cadbury in 'Global Corporate Governance Forum', World Bank 2000). These codes have

proposed ways of enhancing the monitoring effect of corporate governance mechanisms, bearing in mind that disclosure is one of these monitoring mechanisms whose extent and effectiveness is dependent on other monitoring mechanisms. In contrast, the critical view regards corporate governance as encompassing the unspoken values and beliefs of ethical egoism that provide the philosophical framework upon which corporate governance reforms have been based (Lovell 2005). Certain authors outside mainstream corporate governance fear that this framework is more facade than substance, providing a convenient shield for extreme rent seeking on the part of governments and capitalists (Fligstein and Choo 2005).

The theoretical approach includes agency theory however the dominant school in the neoclassical/neoliberal literature emphasises on the positive effects of near perfect markets and information Efficient Market Hypothesis, negative effects of imperfect markets, ownership concentration, asset tradability and liquid markets and the belief in developmental and convergence approaches. A further approach to corporate governance mechanisms is derived from Alchian (1950) and Stigler (1958) on the evolutionary theory of economic change that suggests that competition may take care of corporate governance. Eventually, product market competition may pressurise companies to minimise costs by adopting rules and policies including corporate governance mechanisms to enable access to debt at the lowest cost (Shleifer and Vishny 1997). In the short term however, investors need to be assured of the return on their capital, as managers have been known to use their effective control rights to pursue projects that benefit them rather than shareholders (Jensen 1986 and Grossman and Hart 1988).

This research follows neither the critical view nor the evolutionary theory of economic change but rather adopts the contemporary view; corporate governance frameworks may be justified given the correct context particularly where levels of mandatory and voluntary disclosures differ, where protection of investors differs and where differences in culture may affect business practice. The contemporary approach provides a context within the finance literature and illustrates the various monitoring mechanisms that enable shareholders to ensure that their interests are protected and decisions are made to benefit the company as a whole. Shareholders apply corporate governance mechanisms to

increase monitoring; these mechanisms assure shareholders of a return on their investment.

Different corporate governance mechanisms that may influence voluntary disclosure practice have been examined in the literature. Ownership structure has been examined by Craswell and Taylor (1992), Hossain *et al.* (1994) and Raffournier (1995); the proportion of non-executive directors by Forker (1992), Malone *et al.* (1993) and the appointment of a non-executive director as chair by Forker (1992) and the existence of an audit committee by Forker (1992). Investors cannot rely on financing without corporate governance mechanisms as such legal protection of investor rights is one essential element of corporate governance mechanisms. This research examines the following proxies as representative of different mechanisms identified in the literature that may have an influence in the variation of VDIC: the ratio of experienced NONEXEC to total directors (EXPRCD), executive remuneration (EXCREM), the existence of a non-executive chair (CNED) and the beneficial shareholding in the ordinary equity of the company held by directors (DIRSHS).

Table 2.1 introduced and discussed the corporate governance analytical framework that forms the basis for assessing and developing testable hypotheses to explain the disclosure of intangible assets. The motivation for the inclusion of corporate governance variables in Model IV is derived in the first instance, from significant management positions that influence disclosure policy including the chair, and executive and non-executive directors. In the second, instance the motivations are derived from the existence of sources of expert and professional advice emanating from the existence of cross-directorships amongst the NONEXEC. The third motivational factor stems from the separation of management functions between executive and non-executive directors and between functions within the board of directors. The separation of significant roles enhances internal control through the segregation of duties. The fourth motivational factor is the influence of management's shareholding in the company. This factor is closely linked to management remuneration, the fifth motivational factor, the effects of which either individually, or in aggregate, may or may not align shareholder and management objectives.

The empirical form of the model and a summary of defined variables are set out below:

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 CNED + \beta_3 DIRSHS - \beta_4 GEAR + \beta_5 EXCREM + \beta_6 EMPC + \beta_7 SIC + \beta_8 MVBV + \varepsilon \quad (7)$$

where

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

Dependent Variable:

WDI: weighted disclosure index based on disclosed ICCA attributes measured as a square root transformation.

Independent Variables:

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

CNED: non-executive chair;

DIRSHS Directors' beneficial shareholding in the ordinary equity of the company measured as a square root transformation;

EXCREM: ratio of executive remuneration to market value.

Control Variables:

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;

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

MVBV: market value to book value ratio.

In Model IV, the dependent variable is represented by WDI the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. EXPRCD represents the ratio of experienced non-executive directors to the total number of directors; it is obtained from the annual report. Experienced refers to cross-directorships or additional appointments as NONEXEC in a separate UK listed company. GEAR is defined as the ratio of debt to equity and is obtained from

DataStream, as is EXECREM, the ratio of executive remuneration to market value. CNED is defined as a non-executive chair and is obtained from the annual report. DIRSHS is the beneficial interests of the directors of the company in its equity and is taken from the annual report. EMPC is taken from *DataStream* and represents the ratio of staff cost to number of employees. SIC is the industry classification that is based on economic activity. This classification is obtained from *DataStream*, as is MVBV that is defined as the ratio of market capitalisation to book value.

Within the context of IC, this research has suggested that corporate governance mechanisms may be closely associated with the SC of the company. The identification, measurement and reporting of IC held may be complex without effective corporate governance mechanisms. The ICF classifies these mechanisms as relating to IC attributes on leadership, communication, quality management procedures, increases in speed of process and quality and networking systems, IC attributes associated with good management practice. Thus, an IC approach would incorporate increasing VDIC as a signal of the effectiveness of management in steering the company to success and protecting the company from potential proprietary costs. Nevertheless, this alternative approach may be a suggestion for further research as the theoretical motivations for corporate governance are explained by agency theory, the first theoretical approach as illustrated in Table 2.3. Model IV introduces SIC as an industry control variable, MVBV as the “hidden value” variable and GEAR as the measure of financial risk and EMPC is introduced as a sensitivity test by controlling for the overall level of employee and management remuneration.

3.2.5. Model V: The Full Model

The final model, Model V the Full Model firstly, compares the two dependent variables the unweighted index (DI) and the weighted index (WDI). A comparative analysis is made to determine whether the weighted index provides significantly different results to the unweighted index. Secondly, in testing the assumption that DI and WDI are discrete, sensitivity tests are carried out through the application of the QREG model. In general, the OLS regression

may have non-normal residuals, so this research applies a quantile regression, which reports similar or better results. Thirdly, this model introduces dummy industry variables. Dummy variables introduced to control for industry include basic (BASIC), engineering (ENG), electrical (ELEC), pharmaceutical (PHAR), retailers (RET), computer (COMP) and services (SERV). The classification of these dummy variables is included in Appendix 2B. Both DI and WDI are included in variations of Model V that account for the sensitivity tests on Model V as indicated above.

The Full Model examines the combined influence of IC investment, risk, industry membership and corporate governance mechanisms on VDIC. SALES is selected as the size proxy. Industry has been identified as a control variable, enhancing the results of regressions by controlling for sector differences. The selection of industry membership variables has been based on classifications that may be differentiated along the lines of IC, as is the case with TMRK and SIC that are introduced in this model. TMRK is an ideal choice as it differentiates companies into those that are IC, R&D and IA intensive and those that are not. The Full Model includes TMRK as both an industry and as an IC investment variable, representing SC. Two measures of risk are introduced as proxies for financial and liquidity risk and two measures of IC investment EMPC and MVTA and two measures of corporate governance mechanisms CNED and EXPRCD. The construction of the model achieves the objectives of identifying the combined and individual effects of the different focus areas. The focus on risk is based on the requirement for financial and liquidity stability sufficient to permit the investment in IC to take place.

As illustrated by Appendix 1A inconsistent results for both GEAR and LQD in the general literature leads to added interest in their association with VDIC. Furthermore, although R&D and IA growth have been predicted to increase performance, no research has investigated the influence of risk within IC studies and only a few have investigated GEAR within IC research. LQD and GEAR are therefore included in Model V as the financial risk variables. These variables represent the financial relations of the company and are included under SC within the ICF. The remaining risk variable BETA has had no significant influence on disclosure in the past and is therefore included only in Model II. EMPC and MVTA are selected as representing investment in IC.

Two corporate governance variables are included in Model V, CNED and EXPRCD. CNED and EXPRCD represent the HC that manages the company.

The primary variables focus on the potential domination of the CNED and the influence of external advice on the corporate governance function. Thus, CNED and EXPRCD are included in the Full Model, ahead of other corporate governance mechanisms, due to their closer association with IC disclosure policy. The CNED is influential in disclosure decisions in addition expert advice of current practice from EXPRCD may be invaluable in the alignment of management and shareholder objectives. The variable CNED captures both the influence of being an executive or non-executive director on the one hand and on the other the effect of combining two executive roles. Similarly the variable EXPRCD combines the HC attributes of cross-directorship that have been deemed to lead to a great range of experience and the role of non-executive director. It is important to include these two variables as they incorporate significant positions in management that may be enhanced by separation of roles and segregation of duties. This differentiation further motivates the inclusion of these variables in the Full Model.

Thus in Model VI, the dependent variable is represented by WDI the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. EXPRCD represents the ratio of experienced non-executive directors to the total number of directors; it is obtained from the annual report. Experienced refers to cross-directorships or additional appointments as NONEXEC in a separate UK listed company. MVTA is taken from *DataStream*; it represents the ratio of value attributed to shareholders to total assets. GEAR is defined as the ratio of debt to equity and is obtained from *DataStream*. CNED is defined as a non-executive chair and is obtained from the annual report. EMPC is taken from *DataStream* and represents the ratio of staff cost to number of employees. SIC is the industry classification that is based on economic activity. This classification is obtained from *DataStream*, as is TechMARK listing a further industrial classification that is based on technologically innovative processes. SALES is the proxy for size in this model and is defined as gross sales less discounts. The empirical form of the model and a summary of defined variables for Model VI are set out below:

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR + \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIC + \beta_7 TMRK + \beta_8 SIZE + \varepsilon \quad (8)$$

where

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

Dependent Variable:

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

DI: unweighted disclosure index based on disclosed IC attributes measured as a square root transformation.

Independent Variables:

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;

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);

MVTA capital productivity; market value to total assets;

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

TMRK : the TechMARK listing;

CNED: non-executive chair;

EXPRCD: ratio of experienced non-executive directors to total directors.

Control Variable:

SIZE: net sales or turnover represent gross sales and other operating revenue less discounts, returns and allowances, measured as a log-transformed variable.

For the purposes of this section, the results of the hypotheses developed with respect the six major variables in Models I, II, III, IV and V are reported in Chapters 5, 6, 7, 8 and 9 respectively.

3.2.6. Collinearity

The descriptive statistics establish the existence of non-normal data distribution. The next step is to identify the existence of or lack of significant multicollinearity between variables included in the models. Multicollinearity is

the problem that arises when two or more of the independent variables in an equation are highly correlated (Kleinbaum *et al.* 1988) this may lead to indications of a linear relationship. The relationship can be positive or negative and can significantly bias the results of the multiple regressions. Multicollinearity is checked by scanning the correlation matrix. The difficulty is to determine what a high value is. For some, a high r is anything above 0.5; for others it is anything around 0.6 (Eastman 1984). However, if correlation coefficient is less than 0.8 it does not seem to offer a serious threat to regression results (Farrar and Glauber 1967 and Judge *et al.* 1985). Based on the findings above, this research adopts 0.5 as its cut-off point.

Three alternative ways can be applied in dealing with collinear variables. The first is to get another data set on the same variables that have no multicollinearity this is not possible for this research as an alternative data set is not available. The second solution is to enter the collinear variables one at a time into the regression model and observe the explanatory power of each variable. The third option is to run two models one with each of the collinear variables in order to determine individual effects. This research follows the third approach; collinear variables are not included in the same equation. The third approach is selected, as it does not require an additional data set. Furthermore, the specification of the model is based on theoretical motivations and the inclusion of each variable within the models is justified by this research's four focus areas. This limitation is expected to affect size and profitability variables that are expected to have higher collinearity. The Spearman's Rank Order correlation coefficient (ρ) (p) is a measure of association between pairs of ordinal variables for a set of cases and is applied in this research. If a company is ranked high (or low) on an independent variable, one can predict that the case will also be ranked high (or low) on the dependent variable.

3.2.7. Statistical Methods

The next sections examine and discuss the benefits and shortfalls of chosen statistical tests and the justification for their inclusion in this research. These tests are applied using the statistical package STATA and comprise non-

parametric tests that include pair-wise correlation tests, Spearman's Rank Order tests, SWILK test (Shapiro and Wilk 1965) for normal data and rank regression analysis, and parametric tests that include the OLS multiple regression analysis. This research acknowledges that an important stage is deciding which statistical methods to use in testing the relationship between the corporate characteristics and VDIC. The employment of parametric tests is based on the assumptions that the observations must be independent (Siegel 1956). The sampling selection was based on a systematic basis, each observation from the population had an equal chance of selection and no one selection influenced the selection of any other. This assumption is therefore satisfied. The observations must be drawn from normally distributed populations. As the tests for non-normality indicated this condition is not satisfied. However, data is seldom strictly normally distributed (skewness $\neq 0$) and data normally indicates heteroscedasticity characteristics (kurtosis < 3).

Nevertheless, recent methods of transforming data before application of statistical tests have further developed the options available to the researcher. Both parametric and non-parametric tests are applied in this study, as it appears that there are certain advantages to be derived from the application of both methods. Non-parametric methods involve, generally, two types of tests: inferential tests and tests of association (Hickey 1986). Inferential tests are used when an investigation is directed towards making comparisons between groups. The tests of association as applied in this research refer to the degree of connection between changes in one variable and changes in another variable. The test is applied in the form of the Spearman's Rank Order test. Inferential tests are not applied in this research. Differences have emerged in the literature on the results of both parametric and non-parametric tests. As indicated above, the second condition has not been met. Most variables are not normally distributed. Nevertheless, Roberts and Gray (1988, cited by Meek and Gray 1989) used a non-parametric method when they found that their turnover variable was not normally distributed. Secondly, unlike parametric tests, there are non-parametric tests that may be applied appropriately to dichotomous data e.g. corporate governance and industry variables. The third point is that it has been argued that using non-parametric tests is likely to assist in obtaining a primary assessment of the hypothesised relationships (Lufti 1989) when tests of

association are conducted. Fourth, using both non-parametric and parametric methods facilitate comparison with prior research, which have used either non-parametric or parametric methods or both. Finally, for added assurance, it may be important to confirm independently the results of one test with the other. As parametric tests presume if the data is normally distributed, then the error term in the regression results may be normally distributed.

Preliminary data examination was conducted through histograms of observed values, normal probability plots and through the application of standard tests on skewness and kurtosis. The technique applied by the OLS regression model is appropriate because of the nature of the data, i.e. DI is measured on a ratio scale and the independent variables are measured on ratio, interval, ordinal and nominal scales. The OLS technique was chosen because other methods, e.g. ordinal scaled probit, do not give better results with rank ordered data (Lufti 1989). Output of the OLS regression model is also easier to interpret (Kaplan and Urwitz 1979). The OLS regression model is often used to explain the extent to which the amount of voluntary disclosure is a linear additive function of some of the company characteristics chosen. OLS regression is not always applied particularly when the dependent variable is a categorical dichotomy (Field 2000). As indicated in the discussion in section 3.2.5 as the OLS regression may have non-normal residuals, the application of the quantile regression model may mitigate the statistical problems associated with the data. This research therefore applies quantile regression, which may be expected to provide similar or better results. Furthermore, the results of the quantile regression undergo similar sensitivity tests with comparison between DI and WDI and with the introduction of dummy variables.

3.3.0. Summary

This chapter has explained the procedures adopted to examine the impact of various corporate characteristics on voluntary disclosure practices. The chapter explained the procedure for selecting the companies to be investigated and their characteristics. The chapter also described how IC attributes of voluntary disclosure were included and how these were selected. The chapter also describes how three other issues relating to the scoring of annual reports were

dealt with. The first issue relates to how voluntary disclosure was measured. In the case of DI, a dichotomous approach was applied awarding "1" whenever an item is disclosed and "0" when it is not. In the case of WDI, a 3-point Likert scale was applied, awarding "2" for an ICCA, "1" for existence and "0" when the item is not disclosed. The second issue relates to the determination of whether a particular item is applicable to a particular company. It was decided that where an item is considered inapplicable after reading the annual report thoroughly the company would not be penalised, so the total number of its expected disclosures was reduced to reflect the number of items not applicable. The third issue concerns how much information is sufficient to earn a point in the scoring process. The ICF describes requirements that warrant a score on each ICCA and IC attribute of voluntary disclosure.

The chapter also explained why the items in the voluntary disclosure index were not weighted in the case of the first index DI but were in the case of the second index WDI. Finally, the chapter described the measurement of the various corporate characteristics and the statistical tests that are applied in this research. The tests include both non-parametric and parametric. The non-parametric methods applied are the Spearman Rank Correlation. The parametric procedure applied is the Ordinary Least Squares (OLS). Various steps were taken to build the best regression models, Models I-V for explaining the variation in VDIC; these steps were described in sections 3.2.1 to 3.2.5. In Chapter 4, the results of the descriptive statistics are tabled. The disclosure indices DI and WDI are first examined. Then the results of the content analysis are reviewed with respect to IC attributes and categories within a company and industry analysis. Reference is made to results of prior comparative studies identified in the literature.

4. Investment in Intellectual Capital and Extent of Intellectual Capital Disclosure

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4.1.0. Introduction

This chapter discusses both the results of the extent of VDIC, the dependent variables DI and WDI and the results of the regression of Model I that is based on independent variables representing management's investment in IC. The first section examines the IC attributes as defined by the ICF. Disclosure levels are discussed and comparisons are made between the IC categories of SC, RC and HC. This section is important, as some prior IC studies have generated research of a comparative nature but only to a limited extent; understanding the nature and extent of the disclosure of IC per attribute and per category enables understanding of the trends in IC reporting. This analysis provides an additional differentiation between DI and WDI, and therefore confirms whether the weighted index provides results that are consistent with those of the unweighted index.

This analysis provides the motivation for the use of WDI as the dependent variable in Models I to V as DI is then applied as a sensitivity test in Model V. In the second section of this chapter, the IC attribute and category analysis raises an expectation as to which IC categories SC, RC or HC may provide significant result in the regression analysis of Model I. The objective of the empirical tests is to establish a relationship between VDIC and investment in IC. The accounting measures applied as representative of SC, RC and HC are outlined in the development of the IC investment hypotheses in Chapter 2 and in the development of the model in Chapter 3. The empirical tests on these hypotheses are reported in this chapter. The next section discusses IC attributes at the company level.

4.1.1. Intellectual Capital Attributes

The results of the individual IC attributes are presented in Table 4.1. DI is a disclosure index based on 23 possible IC attributes. Each index is calculated based on a ratio of IC attributes actually disclosed to 23 possible IC attributes. WDI is a weighted index. Attributes not disclosed are allocated a score of zero, attributes disclosed are allocated a score of 1 and attributes displaying competitive advantage in their disclosures are allocated a score of 2.

IC Categories	IC Attributes	DI Actual # of IC attributes disclosed	% of total attributes Disclosed	WDI Actual # of ICCA attributes disclosed	% of total attributes Disclosed
Structural Capital	1.Patents	80	2	104	2
	2.Copyrights	3	0	3	0
	3.Trademarks	80	2	104	2
	4.Management philosophy	309	7	328	5
	5.Corporate culture	115	2	131	2
	6.Management processes	309	7	449	7
	7.Information systems	192	4	269	4
	8.Financial relations	78	2	80	1
	9.Brands	283	6	442	7
	10.Customers	375	8	490	8
	11.Customer loyalty	369	8	546	9
	12.Distribution channels	373	8	502	8
	13.Business collaborations	246	5	333	5
	14.Licensing agreements	73	2	104	2
	15.Favourable contracts	205	4	301	5
	16.Franchising agreements	59	1	81	1
	17.Know-how	325	7	482	8
	18.Training	142	3	165	3
	19.Level of education	111	2	131	2
	20.Vocational qualifications	53	1	61	1
	21.Training and development	123	3	157	2
	22.Entrepreneurial spirit	390	8	618	10
	23.Innovativeness	380	8	539	8
Total		4673	100	6420	100
A/B		9746		19492	
Disclosure indices (DI/WDI)		0.48		0.33	

Source: Annual Reports; A - Total possible disclosures (443*22); B - Total possible disclosures (443*22*2); 22 (23 IC variables less SC No: 2, copyrights, not applicable)

Each company can therefore score a maximum of 46. The index is calculated based on a ratio of IC attributes actually disclosed to 46 possible IC attributes. Table 4.1 illustrates the results of the content analysis. Columns 1 and 2 present the classification of IC per category and per attribute. Column 3 indicates the results for DI being the number of actual IC attributes disclosed. Column 5 indicates the results for WDI being the number of actual ICCA attributes disclosed. Columns 4 and 6 provide the percentage of the disclosure of each IC attribute for DI and WDI respectively. Rows 3 to 26 provide the results of each IC and ICCA attribute. The final 3 rows provide the results for the calculation of the indices DI (48%) and WDI (33%).

HC attributes, entrepreneurial spirit and innovativeness, are the two most disclosed individual IC attributes for DI and for WDI. As management is increasingly keen to develop new products and services, annual reports may disclose activities that signal entrepreneurial spirit and innovativeness. The RC attribute customers have scored third highest in the 23 IC categories. Disclosure of trade skills, expertise, technical knowledge and other competencies are important factors in developing comparative advantage. Management disclose these IC attributes to inform the markets of employee quality and competence in particular entrepreneurial spirit without which venturing activities may not succeed or take off. Human resources and work related knowledge are IC attributes identified by Guthrie *et al.* (1999) in Australia as the most disclosed attribute. Similarly, work-related staff competencies were identified by April *et al.* (2003) in South Africa. Additional studies by Abeysekera and Guthrie (2005) identified entrepreneurial spirit and work related knowledge as highly disclosed HC attributes in Sri-Lanka.

The next relatively high scoring categories are customer loyalty and distribution channels for DI. These results suggest that RC attributes have a higher frequency in terms of IC attributes disclosed by management. The knowledge of customer relations and marketing channels seems high in management's disclosure hierarchy. This finding is consistent with results from Brennan (2001) for Ireland who identified customers and business

collaborations as high disclosure, IC attributes. Business collaborations, customers and brands were also disclosed significantly in April *et al.* (2003) for the South African study.

Two other categories of IC scored high, management philosophy (7%) and management processes (7%) for DI. Management processes describe overall increases in efficiency of labour, capital and structural applications and in increases in speed of process, process quality and product/service quality suggesting a high content of effective management procedures. Management philosophy describes the values and principles of the organisation and incorporates individual and collective characteristics that are applied to the organisation by management. April *et al.* (2003) reported a high level of disclosure of management processes in South Africa. Guthrie *et al.* (1999) found a similar high incidence of organisational and workplace structure disclosures in Australian annual reports. Copyright, a SC attribute is the least disclosed IC attribute. Only three companies disclosed this SC attribute. Due to this lack of disclosure, this research eliminates copyrights as not applicable to all companies. Copyrights are IC attributes normally reserved for the media and publishing industries. Furthermore, publishing may occupy only a small segment of a media giants operations, as such copyrights may be held by a subsidiary. The holding company can at its discretion, disclose a subsidiary's IC in its annual report. This argument may hold for some but not all IC that becomes part of a holding company through the acquisition of a subsidiary. FRS 7.10 stipulates that where an IA is recognized in an acquisition the fair value should be based on its replacement cost that is normally, its estimated market value. This research therefore recognises only 22 categories as the total possible disclosure classification in terms of the calculation of both DI and WDI in this way no company is penalised for not being a publishing company.

Other low disclosure categories include vocational qualifications (HC), franchising agreements (RC), licensing agreements (RC), financial relations (SC), patents (SC) and trademarks (SC). Out of the 443 sample companies, 53 companies disclosed vocational qualifications for DI and 61 for WDI. Contrary

to other HC categories, management do not disclose high levels of vocational qualifications. This may be due to secretive management policies aimed at retaining staff and reducing the possibilities of staff moving to competitors. Franchising and licensing agreements may again be industry or sector specific. Retailers and other marketing industries are associated with franchises. Licensing may be found in the biochemistry and chemical industries. Fifty-nine companies disclosed franchising agreements and 73 companies disclosed licensing agreements. The next least disclosed IC attribute is financial relations. The low disclosure of this SC attribute may be attributed to the complementary financial information that is disclosed in the financial statements. Intangible relations may be inferred from this financial information. Furthermore, competitive pressures may motivate reduced disclosure as good financial relations may indicate growth potential and high return on investment in future projects. Management may limit disclosure of these prospects. Seventy-eight companies disclosed their financial relations.

Eighty companies disclosed both trademarks and patents. Regulation of these SC attributes external to accounting disclosure may mitigate the lack of voluntary disclosure in management's view. Companies are required to register patents and trademarks separately. The public has access to this information. Although accounting disclosure of patents and trademarks is not regulated in annual reports, the impact of other legislation may reduce management's voluntary disclosure of these SC attributes. Two other variables, information systems, disclosed by 192 companies and favourable contracts disclosed by 205 companies form a small group of the remaining high disclosing categories. A recent study by Vergauwen and Allem (2005) on the Netherlands, France and Germany found high disclosures of information systems. Different companies are expected to utilise different levels of information systems in their organisations, employees technical skills may influence the use of these systems.

In conclusion, the results of DI and WDI do not indicate significant variance in the analysis of individual IC and ICCA attributes. The dispersion of

attributes amongst the IC categories is almost identical. Entrepreneurial spirit and innovativeness are the two most disclosed individual IC attributes for WDI. Patents and vocational qualifications are again amongst the least disclosed IC attributes. Customers and customer loyalty are again amongst the top six disclosing IC categories. Overall between the three classifications of IC, SC attributes have been least disclosed and RC most disclosed.

4.1.2. Intellectual Capital Categories

The IC attribute analysis indicates that entrepreneurial spirit (HC), innovation (HC), expertise (HC), brands (RC), customers (RC), customer loyalty (RC), distribution channels (RC) and business collaborations (RC) are the most reported IC attributes; whereas copyrights (SC), vocational qualifications (HC), franchising agreements (RC), licensing agreements (RC), financial relations (SC), patents (SC) and trademarks (SC) are the least reported IC attributes.

Table 4.2 Descriptive Statistics DI, WDI, SC, RC and HC

IC Attributes	Mean	Median	Minimum	Maximum	Standard Deviation
DI	0.48	0.45	0.09	0.86	0.14
SC	0.33	0.38	0.00	0.88	0.17
RC	0.56	0.63	0.00	1.00	0.17
HC	0.49	0.43	0.00	1.00	0.23
WDI	0.33	0.32	0.07	0.75	0.13
SC	0.21	0.19	0.00	0.56	0.12
RC	0.39	0.38	0.00	0.88	0.18
HC	0.35	0.29	0.00	1.00	0.18

Source: Descriptive statistics on research data

Consistent with the analysis on IC attributes, Table 4.2 presents the results of DI and WDI at the category levels, SC, RC and HC. This table confirms that management discloses more RC than they do either SC or HC. In

addition, SC appears to be the least disclosed IC classification. These results are consistent with respect to both DI and WDI. These results are consistent in part with Goh and Lim (2004); their study from Malaysia found the distribution of IC disclosure to be 41% external capital (RC), 37% internal capital (SC) and 22% employee competencies (HC). Table 4.2 indicates that with a mean of 0.33, SC is the least disclosed classification whilst RC with a mean of 0.56 is the most disclosed IC classification in this research.

This contradicts the findings of Goh and Lim (2004) who reported HC classification as the least disclosed IC classification. Bozzolan *et al.* (2003) in Italy identified the same trend as that of Goh and Lim (2004). Bozzolan (2003) identified that 49% was related to external structure (RC), 30% was related to internal structure (SC) and the remaining 21% to HC. Different country regulations, varying sample sizes may have a different influence on research results. Bozzolan *et al.*'s (2003) sample consisted of 30 Listed Companies from the Italian Stock Exchange in 2001 and Goh and Lim's (2004) sample in Malaysia consisted of the top 20 profit making public listed companies which was tested through questionnaires and interviews. In addition, management's disclosure policies may be governed by cultural perspectives that may differ from country to country.

With respect to the ICF, all IC attributes included in the framework were disclosed; however, there was very few companies disclosing copyrights. This research has adopted copyrights as part of its ICF but has not penalised companies that have not disclosed them. Companies in industries not associated with copyrights were scored based out of 22 IC attributes. Those companies in industries associated with copyrights were scored out of the 23 IC attributes. The results indicate that the IC attributes included were appropriate; all attributes were disclosed although to varying degrees but no one attribute was disclosed significantly more than others were. Table 4.3 indicates that the results of the individual IC categories SC, RC and HC and the disclosure indices DI (48%) and WDI (33%) have been generally comparative to previous studies. Guthrie and Petty (2000) reporting the extent of disclosure at 30% for

HC and SC and 40% for RC. Bozzolan (2003) reported an average DI of 51% whilst Goh and Lim (2004) in Malaysia, reported an average DI of 61% for their investigation. Despite the variance in the size of the samples applied and the number of attributes in the IC frameworks, differences in legal frameworks and reporting cultures HC appears to have been the least reported IC category in prior studies whereas DI and WDI place HC second to RC. It may be that the country of investigation may be a contributing factor or that recent reporting trends include higher levels of HC attributes.

Table 4.3 Descriptive results from prior content analysis studies

	Average # of IC attributes/company	Total	SC	RC	HC
DI	11	48	33	56	49
WDI	7	33	21	39	35
Guthrie <i>et al.</i> (1999)	N/A	33	30	30	40
Guthrie and Petty (2000)	8.9	N/A	40	30	30
Abeysekera and Guthrie (2000)	N/A	N/A	49	29	22
April <i>et al.</i> (2003)	10.4	N/A	40	30	30
Bozzolan <i>et al.</i> (2003)	N/A	51	49	30	21
Goh and Lim (2004)	14.6	61	41	37	22

Source: Prior content analysis studies

Thus within the UK, RC is the most disclosed category, followed by HC and then SC. RC is associated with customers, distribution channels and markets including IC related to increasing market share and turnover. Entrepreneurial spirit, innovativeness and know-how are the most individually disclosed IC attributes. RC is the category with the most IC disclosures overall.

It appears that customer relations and marketing strategies are more important to management. Guthrie and Petty (2000, p.248) argue that the external structure emphasis is due to recent trends in improving distribution chains, firm-value chains and reassessing customer value. Expanding global markets too have motivated some companies to increase their market share. Copyrights (SC), vocational qualifications (HC), franchising agreements (RC), licensing agreements (RC), financial relations (SC), patents (SC) and trademarks (SC) have been shown to be the least disclosed IC attributes. Significant in these results is the low reporting of SC. The motivation for voluntary disclosure of SC may be decreasing as the ability to title and ownership increases. In addition, although accounting disclosure of patents and trademarks is not regulated in annual reports the impact of other legislation may reduce management's voluntary disclosure of these attributes in the annual report, if the information is easily available as is the case for patents, in the patents register.

Sections 4.1.1 and 4.1.2 have discussed the disclosure indices based on number of IC and ICCA attributes disclosed. Thus within the UK, RC is the most disclosed category, followed by HC and then SC. Table 4.3 indicates that the results of the individual IC categories SC, RC and HC and the disclosure indices DI (0.48) and WDI (0.33) have been generally comparative to previous studies. In conclusion, the results of DI are not at variance with those of WDI in the analysis of individual attributes and categories. The dispersion of attributes amongst the IC and ICCA categories is almost identical. Entrepreneurial spirit and innovativeness are the two most disclosed individual IC attributes. Patents and vocational qualifications are the least disclosed IC attributes. Customers and customer loyalty are the top six disclosing IC categories. Overall between the three classifications of IC, SC attributes have been least disclosed and RC most disclosed. The next section examines the hypothesised influence of selected intellectual capital investment variables on the extent of IC disclosure.

4.2.0. Model I: Investment in Intellectual Capital

This section presents the result of the regression analysis of Model I.

$$WDI = \beta_0 + \beta_1 EMPC + \beta_2 R \& D - \beta_3 MANUF + \beta_4 TMRK + \beta_5 SIZE + \varepsilon \quad (4)$$

The objective of the empirical tests is to establish a relationship between VDIC and investment in IC. Chapter 2 outlines the development of the IC investment hypotheses. The empirical tests on these hypotheses are reported in this section. Chapter 3 developed the model represented by the equation presented above. The specification of the model is discussed in section 3.2.1. Data analysis examines the correlation of the variables included in Model I. This research concludes that data is non-normally distributed and therefore following Cooke (1998, p.210-215), transformations are applied before regression tests. The choice of approach to accounting for statistical problems associated with non-normal distributions has been discussed in Chapter 3. Model I is a robust regression run on data transformed by logs and square roots to statistically control for non-normal distributions. The quantile regression is applied as a sensitivity test for the results of the OLS regression that are susceptible to non-normal residuals. The next section discusses the descriptive statistics and the level of association of variables in Model I.

4.2.1. Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Descriptive statistics for the dependent and independent variables are reported in Table 4.4. The results of the univariate analysis are obtained from the partial correlation matrix that illustrates the nature, direction and significance of the bivariate relationships of SRWDI and the independent variables. In addition, Table 4.4 reports the results of the Pearson correlation coefficients between WDI and the independent variables and the bivariate statistical correlations

Table 4.4 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Variable	Mean	Standard deviation	Minimum	Maximum	COR	A	B	C	D	E	F
A SRWDI	0.561	0.118	0.265	0.866		1					
B LNMV	5.624	2.013	0.536	11.436	0.455***	0.393***	1				
C TMRK	0.164	0.371	0.000	1.000	0.225***	0.217***	-0.127***	1			
D MANUF	0.476	0.500	0.000	1.000	-0.234***	-0.230***	0.129***	-0.324***	1		
E EMPC	48.210	302.911	0.000	6323.900	0.096**	0.112**	0.038	0.003	-0.048	1	
F R&D	66.161	386.396	0.000	3841.780	-0.084*	0.094**	0.366***	0.025	0.028	-0.013	1

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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;

LNMV: Size being MV representing the share price multiplied by the number of ordinary shares in issue measured as a log-transformed variable;

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

MANUF: dichotomous variable that scores "1" for manufacturing and "0" for non-manufacturing;

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);

R&D: research and development expenditure.

between all independent variables. The results of the descriptive statistics on the disclosure index have been discussed with and respect to Table 4.2 in which the untransformed independent variable is reviewed with respect to DI and WDI and to the individual IC categories. The results of the descriptive statistics on SRWDI indicate that there is a wide range of variation in the extent of VDIC. This result indicates that the sample companies have great flexibility in their IC voluntary disclosure practices. Dichotomous variables indicate that 16% of the sample companies are members of the TechMARK listing and that 48% companies are involved in manufacturing activities. A significant correlation at 1% is found between SRWDI and MV, TMRK and MANUF. EMPC and R&D are significant at 5%. In general, the direction of the relationships is consistent with the expected sign; however, the partial correlation coefficient of SRWDI with R&D is negative indicating that increasing R&D expenditure may result in lower VDIC.

This research attributes this trend to management's awareness of competitive losses that may result if proprietary information is disclosed. The expectation of a positive significant association between R&D and VDIC has not been realised. The benefits of signalling may be outweighed by disclosure costs resulting in R&D being insignificant in explaining the variation in VDIC. Nevertheless, this relationship is significant only at 10% and therefore the association may be weak. MANUF as a non-IC based industry classification is negative and significant at 1%. The direction of the association is consistent with the expected sign. The MANUF variable indicates that disclosure of IC attributes may be industry specific. The expectation of a positive significant association between MV as a proxy for size and VDIC has been realised.

To establish the relationship between SRWDI and the independent variables, this research presents the Pearson correlation matrix in Table 4.4. The correlations are not sufficiently significant to influence the individual effect of each other. In addition, Table 4.4 illustrates that associations are significant at 1% for MV, TMRK and MANUF. The result of the correlation test between SRWDI and EMPC is significant at 5%, consistent with the univariate analysis; however, the results of R&D indicate a positive and stronger association than that reported in the univariate analysis. This result is in contrast to that of the univariate analysis, illustrating that companies that engage in R&D expenditure

make significantly more IC disclosures than those with no R&D investment. The collinearity between TMRK and MANUF (-0.32) illustrates that high-tech companies are non-manufacturing. The largest level of collinearity in Model I exists between MV and R&D (+0.37). This association indicates that increasing investment in R&D leads to increased shareholder value. Significant collinearity identified between the IC variables suggests that TMRK companies are generally not very large. These companies are associated with non-manufacturing; this finding is consistent with non-manufacturing companies being more IC intensive and consistent with evidence that suggests manufacturing companies are larger.

Table 4.5 Descriptive statistics by industry

Industry Group	SRWDI	LNMV	TMRK	MANUF	EMPC	R&D
Mean						
BASIC	0.510	6.023	0.000	1.000	35.092	8.003
CHEM	0.488	5.627	0.000	0.480	22.906	82.983
ENG	0.490	5.797	0.465	1.000	33.191	249.519
ELEC	0.595	5.710	0.340	0.660	41.077	70.173
PHAR	0.700	6.649	0.769	0.000	531.435	605.378
RET	0.493	5.481	0.021	0.319	20.970	57.821
COMP	0.600	5.229	0.248	0.000	36.258	10.980
SERV	0.602	5.838	0.121	0.759	33.247	1.730
Standard deviation						
BASIC	0.115	1.952	0.000	0.000	31.421	33.711
CHEM	0.113	2.294	0.000	0.510	13.676	298.092
ENG	0.101	2.166	0.213	0.000	59.050	847.854
ELEC	0.117	2.211	0.479	0.479	51.301	304.025
PHAR	0.076	2.747	0.439	0.000	1740.654	1111.729
RET	0.096	1.929	0.146	0.471	12.976	389.043
COMP	0.103	1.911	0.434	0.000	15.842	63.060
SERV	0.101	1.651	0.329	0.432	73.109	8.866

Source: Descriptive statistics on research data

Basic (BASIC): forestry and paper, food producers and processors, beverages, tobacco and construction and bldg materials industries;

Chemical (CHEM):	chemicals, personal care and h'hold prods, household goods and textiles;
Engineering (ENG):	steel and other, engineering and machinery, automobiles and parts and aerospace and defence industries;
Electrical (ELEC):	info tech hardware, electronic and electrical equip't, electricity, utilities (Ex-electricity) and diversified industries;
Pharmaceutical (PHAR):	pharmaceuticals and biotech
Retailers (RET):	general retailers, food and drug retailers
Computer (COMP):	software and computer services, support services, telecommunication services, media and entertainment
Services (SERV):	transport, health, leisure and hotels

Table 4.5 presents descriptive statistics by industry consistent with the analytical framework in Table 2.1 and the RBV approach. The disclosure index SRWDI, illustrates that pharmaceutical and service companies have on average a higher extent of IC disclosure whereas chemical and engineering companies have lower levels of VDIC. Furthermore, the size variable illustrates that those companies endowed with a larger IA resource base such as pharmaceutical companies are associated with a higher market value. These companies invest significantly more resources in R&D and in EMPC. In contrast, service and basic companies have little investment in R&D. Industry variables indicate that most TMRK listed companies are found within the pharmaceutical industry, whereas the majority of manufacturing companies are associated with basic and engineering sectors. These results provide support for the results of the descriptive statistics reported in Table 4.4. The next sections discuss the parametric procedures, the data transformations applied in this model and the regression results of Model I.

4.3.0. Multivariate Analysis

Table 4.6 presents the regression results of Model I. As disclosed in Table 4.4, there is no multicollinearity in the data; Hair *et al.* (1995) state that multicollinearity is only a problem when correlation values exceed 0.80. This research therefore applies a sensitivity test as an effective test of multicollinearity: the variance inflation factor (VIF). This factor is reported in

Table 4.6 collinearity does not appear to be a serious problem in Model I as neither the highest factor nor the mean VIF exceeds two. Myers (1990) suggests that a VIF of 10 is cause for concern as the regression may be substantially biased if the average VIF is substantially greater than one. Thus, an average VIF of 1.12 confirms that collinearity is not a problem.

Table 4.6 Regressions for the Model I: Financial Measures of IC

Model	1.1	1.2	1.3	1.4	1.5	1.6
Dependent variable	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI
Independent variables						
CONSTANT	0.418*** (26.74)	0.411*** (17.75)	0.441*** (20.32)	0.391*** (16.20)	0.414*** (20.26)	0.429*** (18.93)
LN MV	0.028*** (11.01)	0.029*** (7.62)	0.027*** (7.22)	0.027*** (6.81)	0.029*** (8.91)	0.026*** (7.29)
TMRK	0.066*** (5.04)	0.073*** (3.71)		0.088*** (4.33)	0.068*** (3.90)	0.056*** (2.79)
MANUF	-0.05*** (5.05)	-0.06*** (4.30)	-0.07*** (5.56)		-0.07*** (5.54)	-0.06*** (4.41)
EMPC	0.000*** (8.22)	0.000*** (8.23)	0.000*** (7.55)	0.000*** (9.40)		0.000*** (8.00)
R&D	-0.000** (2.00)	-0.000 (0.69)	-0.000 (0.90)	-0.000 (0.89)	-0.000 (1.10)	
Mean VIF	1.120					
Z	0.14					
F ¹	63.62					
R ² (adjusted or pseudo)	0.28	0.16	0.13	0.13	0.15	0.15
N	439	439	439	439	439	439

VIF: Variance inflation factor
Z: OLS specifications reported normal residuals ($z = 0.14$) and these models (1.2 to 1.6) were re-specified using quantile regression. 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; *** $p < .01$; ** $p < .05$; * $p < .10$

A robust linear regression is run on the independent variables. The F – statistic 63.62 is significant at 1%. The value of R^2 is 0.28. The large F -statistic indicates that the linear equation fits the model. Overall, the model appears robust; the sample size is large (439 observations).

This research formulates a one-sided test as a statistical hypothesis in which the coefficients for which we can reject the null hypothesis, $H_0 > 0$. This research formulates the null hypothesis to determine if Model I has any explanatory power.

$$H_0: \text{all coefficients are } < \text{“0”}$$

In order to decide whether the null hypothesis is rejected, the value of F necessary to reject the null hypothesis is determined. This research rejects H_0 when $F_{observed} > F_{critical}$. Thus $F_{(0.05, 5, 439)} = 2.23$. This research rejects the null hypothesis that all the variables jointly have no explanatory power in the model. As $F > F_{critical}$, H_0 is rejected and this research concludes that Model I has some explanatory power.

In addition, the adjusted R^2 of 0.28 for the regression indicates that the variables MV, TMRK, MANUF, EMPC and R&D are significant in explaining the variation in VDIC. Note that the coefficients of these independent variables are statistically significant at 5%. Sections 4.3.1 to 4.3.5 discuss the results of the individual variables and the hypothesis that are developed for the empirical tests.

All variants of Model I, 1.2 to 1.6 are consistent with the results of the OLS Model 1.1 with the exception of R&D that is insignificant in the QREG model. The negative coefficient for R&D may be indicative of the existence of disclosure costs that may be explained by competitive cost hypothesis; increasing investment in R&D may lead to lower disclosure levels as management protect proprietary information from competitors. The results of the partial and Pearson correlation matrix reported in Table 4.4 provide consistent results with respect to the influence of R&D on VDIC in addition the multivariate analysis echoes this inconsistency with the predicted sign. Table 4.5 illustrates that the chemical industry may have significant levels of R&D, however the disclosure index illustrates that VDIC may be restricted. Sections

4.3.1 to 4.3.5 discuss the results of the influence of the independent variables. The results from Table 4.5 confirm or reject the hypothesised influence of these variables and the theoretical approach adopted.

4.3.1. Market Value (MV)

As estimated, size as measured by MV has a positive and significant influence on the variation in VDIC. Larger companies may be more susceptible to political, competitive, marketing and or product market forces (Stigler 1971, Jensen and Meckling 1976, Watts and Zimmerman 1978 and Skinner 1994) and may react by the disclosure of IC as generally MV may be associated with a larger the relative content of IC. Furthermore, as disclosure may expose companies to public enquiry, IC disclosure may be a means of avoiding these political costs. These costs are associated with increased public scrutiny and demands for more transparency and information. Agency theory explains asymmetry of information that may be attributed to size and increasing numbers of shareholders.

Size as measured by MV has been confirmed as a significant positive variable in Chow and Wong-Boren (1987), Lang and Lundholm (1993), Hossain *et al.* (1994), Owusu-Ansah (1998), Eng and Mak (2003) and Abdolmohammadi (2005). Size in any country appears to be an important explanatory variable whether measured by TA, turnover (Firth 1979), or MV (Hossain *et al.* 1994 and Lang and Lundholm 1993). As little or no effective IC regulations exist, reporting of IC has been mainly self-regulated, being influenced by availability of resources and industry trends. The increase in VDIC signals the company's competitive advantage and reduces information asymmetry between management and investors. Although certain factors including proprietary costs and competitive costs may restrict full disclosure, barriers to imitation may deter incumbents from entering the field. For larger companies the benefits of signalling IC are expected to outweigh the potential disclosure costs arising from political costs. Being larger and having access to more resources, larger companies may be more successful. Management behaviour is explained by signalling theory as VDIC may be influenced by the

intangible content included in MV. MV is therefore a significant positive variable on the extent of VDIC, hypothesis H1.2: in Model I is accepted.

H1.2: MV is a positive significant explanatory variable of the variation in the extent of VDIC.

4.3.2. TechMARK Listing

Companies that have been admitted as members of the TMRK listing are associated with higher levels of IC disclosure relative to non-members. Previous industry studies by Bozzolan *et al.* (2003), Williams (2001) and Cooke (1989, 1991 and 1992) yielded significant results. The variable TMRK is significant at 1%. The understanding is that a listing on the innovation technology index is a result of an intensive long-term plan to invest in and maintain investment in IC as such the index cuts across some industrial sectors. The company's business growth and success must be dependent on technological development or innovation. Such companies are involved in innovative business, with new products or services, or new methods of business, with existing organic growth in revenue, historic and prospective, arising from the innovative business and relevant management expertise that has to be demonstrated to the satisfaction of the LSE before any listing takes place (FTSE 2006). The general trend has been that innovative technology companies disclose more than non-innovative and non-technological companies do as they signal superior IC potential.

Political costs in high tech, pharmaceutical, telecommunication and software companies are likely to be higher due to investments in IA. The rapid increase in the value of such companies poses a risk for stock markets due to the increase in the risk attributed to such IC investment. Analysts and investors associated with these industries may demand additional disclosures to clarify the issues arising from the MVBV phenomenon. Furthermore, competitive pressures and the need to signal a competitive advantage motivate management to a maximum disclosure policy as they increase VDIC. The theoretical motivation is derived from the RBD approach and signalling theory. As these high-tec companies may have IP, licenses, patents and brands, the potential

disclosure costs are exceeded by the potential benefits of increased disclosure of proprietary information. Investment in R&D, innovation and technology requires substantial financial investment, skilled employees and adequate marketing including listing on the TMRK. These innovative technology companies include computer hardware, computer servicing, internet, semi-conductors, software, telecom equipment, biotechnology, specialist pharmaceuticals, drug delivery and medical technology. Management of these companies signal this investment, indicative of procedures to accumulate competitive advantage by disclosing ICCA. Potential wealth increases are attributed to VDIC whilst competitive costs are expected to suppress VDIC. TMRK is positively associated with the extent of VDIC in Model I. The conclusion for this variable therefore is that hypothesis H3.1: is accepted.

H3.1: TMRK is a positive significant explanatory variable of the variation in the extent of VDIC.

4.3.3. Manufacturing (MANUF)

The results indicate that companies whose main economic activity is based on manufacturing are less likely to provide VDIC than non-manufacturing companies are. The non-parametric and the parametric results for Model I are negative and significant at 1%. This association between disclosure and MANUF is supported by Cooke (1991), Ho Wong (2001) and Camfferman and Cooke (2002). The results suggest that manufacturing companies are less likely to have higher levels of VDIC; non-manufacturing companies are expected to utilise more IC than tangible assets in their operations. Previous studies by Bozzolan *et al.* (2003) and Cooke (1992) yielded significant results. This variable MANUF is negative and significant at 5%. This research classified industries into manufacturing and non-manufacturing according to Cooke (1992) found that manufacturing companies are significantly associated with higher levels of general disclosure, in contrast, Model I indicates that manufacturing companies are negatively associated with VDIC. Non-manufacturing companies are expected to utilise more IC than tangible assets in their operations. In this model, the results are consistent with the expectation

that low IC content leads to low VDIC and that non-manufacturing companies disclose ICCA. The motivations are derived from the resource base of these companies and signalling theory that predicts the benefits of signalling these IA resources. These companies disclose ICCA attributes due to the lack of disclosure costs, consistent with disclosures in sectors of high barriers to imitation and due to the existence of higher levels of “hidden value”. Management may increase VDIC to illustrate their competitive edge and restrict voluntary disclosure in areas where no competitive advantage exists. Being unique, IC resources may be patent protected, may require large financial and HC resources, may take a lengthy process to develop and may be specific to certain processes, departments, companies or industries. In this research, manufacturing companies apply mainly tangible assets in their operations and therefore disclose less IC. IC content held may lead to VDIC when proprietary costs are mitigated. The conclusion for this variable therefore is that hypothesis H3.2: is accepted.

H3.2: MANUF is a negative significant explanatory variable of the variation in the extent of VDIC.

4.3.4. Employee Cost (EMPC)

The results indicate that increasing remuneration per employee positively influences greater VDIC by management. Increasing salary cost per employee may be attributed to higher levels of education, more experience and highly complex professions. In an environment in which measurement of HC is complex, EMPC is a proxy for the value of HC in companies or alternatively, the rent required to maintain the HC in place. The motivation for this hypothesis is based on signalling theory. Proprietary costs are mitigated in the first instance by the perceived benefits of signalling and in the second by the disclosure of “better than the worst case scenario” that the markets would have assumed. This signalling is consistent with investment in training, health insurance and pension plans as employers signal their successful investment in HC through increased VDIC. An additional explanation may be found in the employee pressure that labour unions may exert on corporations. Trade unions

may support employees in bargaining, requiring more disclosures from management. The dependence of the company on employees as a resource without which the company cannot operate and that may not be easily replaced due to specialisation, may lead management accede to employee demands for additional VDIC.

This variable confirms the expectation that companies with high levels of HC content disclose ICCA. Table 4.1 confirms that entrepreneurial spirit and innovativeness are the two most reported IC attributes. The demand for information from this stakeholder group may be specific and therefore require more disclosure in particular with respect to HC. Such companies are likely to be highly IC service orientated and may therefore provide more VDIC to mitigate the MVBV dilemma. Disclosure costs include risk of pressure from labour unions and other regulatory bodies. Pressure from competitors too, may curb full disclosure due to the mobility of employees in some industries. These motivations are expected to outweigh any competitive pressures and labour related proprietary costs that are associated with such disclosures. The literature has indicated that disclosure is associated with various measures of HC. Singhvi (1968) and Wallace (1987) reported a significant relationship between management type and mandatory and voluntary disclosure. The results of variables that are derived from individuals within management have generally been insignificant; these results raise questions as to the influence of individuals on the disclosure decision. Ahmed (1996) found no relationship between mandatory and voluntary disclosure and qualifications of the accounting officer. In addition, an insignificant relationship was established by Haniffa and Cooke (2002) between the qualifications of the financial director and voluntary disclosure.

Higher EMPC may be associated with a more skilled work force, therefore companies with higher EMPC may be characterised by higher levels of HC content. Such companies are likely to be highly IC service orientated operations and may therefore signal ICCA. Table 4.5 illustrates that such companies include pharmaceutical and electrical industries that have both high EMPC and higher levels of VDIC. The expectation of a significant positive relationship is confirmed. Effective human resource practices are expected to

lead to signals that indicate competitive advantage to the markets. The conclusion for this variable therefore, is that hypothesis H5.1: is accepted.

H5.1: EMPC is a positive significant explanatory variable of the variation in the extent of VDIC.

4.3.5. Research and Development Expenditure (R&D)

The results do not confirm that R&D is a positive determinant of VDIC. The results indicate that R&D companies are characterised by low levels of VDIC. Table 4.5 illustrates that although both chemical and engineering companies invest in R&D these resources do not culminate in a high disclosure index. The results of the QREG model provide contrasting results to those of the OLS model as the association is found to be weaker and insignificant. This inconsistency is illustrated in the results of the partial correlation and Pearson correlation matrices. Nevertheless, as the results of the OLS model are robust, this research confirms the existence of a negative association consistent with the expectation that competitive costs may limit the disclosure of IC. Although R&D may signal success to the market and although innovation reduces the marginal costs of production by translating into lower expected marginal costs, VDIC due to a high level of R&D activity may lead to the loss of competitive advantage as trade secrets and know-how may be revealed to competitors. This behaviour is consistent with the proprietary costs hypothesis.

The results reject signalling as the theoretical explanation. ICCA attributes are therefore not disclosed, as the benefits of signalling IC do not appear to outweigh the potential competitive pressures. The motivations for a positive association may be derived from Gray *et al.* (1995) who confirmed a positive significant relationship with the voluntary disclosure and R&D information. However, Depoers (2000) confirmed a positive association with barriers to imitation; indicating that the existence of barriers to imitation are a necessary element if proprietary costs are to be reduced and VDIC increased. This research rejects that R&D is a significant positive variable on the extent of VDIC, hypothesis H7.2: in Model I is rejected.

H5.2: R&D is a positive significant explanatory variable of the variation in the extent of VDIC.

4.4.0. Conclusion

In general, the results indicate that no company is consistent in disclosing all IC attributes. DI and WDI have exhibited similar characteristics, particularly as all companies that disclose a competitive advantage (WDI) disclose an IC attribute (DI) as such, a significant number of companies (69%) that disclose IC attributes disclose a competitive advantage. Generally, companies disclose more RC than either SC or HC. Although at the individual attribute, the top three IC attributes are disclosed from HC category, on an overall basis however total RC attributes disclosed exceed HC attributes disclosed.

The results of the empirical tests in Model I indicate that IC investment proxies representative of SC, RC and HC are associated with VDIC. The parametric tests indicate that VDIC by service, highly complex and high-tech companies whose equity is made up of intangible value may be restricted by competitive costs and political costs as illustrated by the weak relationship; the multivariate results indicate that R&D companies have lower levels of VDIC. As a HC measure of the level of technical expertise, higher levels of EMPC is indicative of the value management places on HC, disclosure of HC attributes signals the existence of this underlying value. Model I is consistent with EMPC as a proxy for HC and TMRK as a proxy for IP (SC). Of interest, MV is significant as a representative of RC; companies strive to increase market share in an effort to increase shareholder value through larger returns. RC is generated in creating markets, larger companies have the resources and technical expertise to signal the existence of this IC that due to its inherent intangible nature may otherwise remain hidden.

This research concludes that the necessary conditions for a maximum disclosure policy include the existence of programmes aimed at investment in IC at a stage of development commensurate with competitive advantage generation. Not all R&D is successful and not all IC generated from R&D leads to competitive advantage. As such, it may be expected that R&D successfully developed into IP, recognisable by third parties and commensurate with

membership of a technological listing may generate competitive advantage. The results indicate that non-manufacturing companies that may be associated with higher remuneration to employees operating in service sectors and characterised by higher levels of “hidden value”, disclose higher levels of IC. Above all, these high disclosing companies are characterised by large MV, indicative of above average shareholder value generated by larger markets. The next four chapters discuss the result of the regression analysis of Models II to Model V. The objectives of the empirical tests are to establish a relationship between VDIC and various risk measures, industry membership and corporate governance mechanisms and to ascertain the effect of DI and WDI in Model V. Chapter 5 presents the results on the association of risk measures and the variation in VDIC.

5. Financial Measures of Risk

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5.1.0. Introduction

This section presents the result of the regression analysis of Model II.

$$WDI = \beta_0 + \beta_1 BETA - \beta_2 GEAR + \beta_3 LQD + \beta_4 SIC + \beta_5 GRWT + \beta_6 MVBV + \beta_7 SIZE + \varepsilon \quad (5)$$

The objective of the empirical tests is to establish a relationship between VDIC and financial and market measures of risk. Chapter 2 outlines the development of the risk hypotheses. The empirical tests on these hypotheses are reported in this section. The specification of the model is discussed in section 3.2.1. Data analysis examines the correlation of the variables included in Model II. Based on this analysis, this research concludes that data is non-normally distributed and therefore following Cooke (1998, p.210-215), transformations are applied before regression tests. The choice of approach to accounting for statistical problems associated with non-normal distributions has been discussed in Chapter 3. Table 2.1 illustrates the analytical framework as discussed in Chapter 1 and 2. Model II is a robust regression equation run on data transformed by logs and squares roots to statistically control for non-normal distributions. The quantile regression is applied as a sensitivity test for the results of the OLS regression that are susceptible to non-normal residuals. The next section discusses the descriptive statistics and the level of association of variables included in Model II.

5.2.0. Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Descriptive statistics for the dependent and independent variables are reported in Table 5.1. The results of the univariate analysis are obtained from the partial correlation matrix that illustrates the nature, direction and significance of the bivariate relationships of WDI and the independent variables; these are reported in Table 5.1. In addition, Table 5.1 reports the results of the Pearson correlation coefficients between WDI and the independent variables and the bivariate statistical correlations between all independent variables. Descriptive statistics

Table 5.1 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Variable	Mean	SD	Minimum	Max	COR	A	B	C	D	E	F	G	H
A SRWDI	0.561	0.118	0.265	0.866		1							
B LNNTA	5.796	2.066	0.747	11.937	0.378***	0.311***	1						
C BETA	0.986	0.429	0.000	2.330	0.088*	0.160***	0.037	1					
D LQD	1.089	1.247	0.000	13.380	0.169***	0.080*	-0.241***	0.178***	1				
E GEAR	0.931	12.379	-6.820	259.530	-0.037	-0.023	0.038	-0.112**	-0.027	1			
F SRSIC	71.609	16.575	14.213	95.969	0.225***	0.165***	-0.121**	0.097**	-0.095**	0.070	1		
G GRWT	0.133	0.343	-0.550	3.890	0.118**	0.122**	-0.079	0.091*	0.111**	-0.022	0.075	1	
H MVBV	2.823	7.284	-52.360	86.000	0.100**	0.097**	0.001	0.001	0.027	-0.027	-0.005	0.024	1

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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 ICA attributes measured as a square root transformation;

LNNTA: Size being TA representing the sum of tangible fixed assets, intangible assets, investments (including associates), other assets, total stocks & WIP, total debtors and cash & cash equivalents is measured as a log-transformed variable;

BETA: systematic risk as measured by a company's beta factor;

LQD: quick assets ratio;

GEAR: $\frac{\text{total debt}}{\text{total capital}} \%$ (long-term debt + short-term debt & current portion of long-term debt) / (total capital + short-term debt & current portion of long term debt) * 100;

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

GRWT: compounded five-year annual sales growth rate;

MVBV: market value to book value ratio.

for the mean value for BETA that is equal to 1 indicates that the sample systematic risk is equal to that of the market. Both GEAR and LQD indicate a mean close to 1 signifying that within the sample, the value of equity finance has been matched by the value of debt finance and that current liabilities are matched by liquid current assets. The descriptive statistics indicate that GRWT and MVBV have negative minimum balances indicating that some sample companies have declining sales and that some sample companies have book values that exceed their MV. Furthermore, the mean of 2.8 for MVBV indicates that overall, shareholder value is almost three times that of the book value and may be an indication of the existence of “hidden value” in the sample companies. The results of the univariate hypotheses tests reported in Table 5.1 indicate that the coefficients of the variables all have the predicted signs but that not all hypotheses are statistically validated. The results of the univariate analysis indicate a significant correlation at 1% is found between WDI and TA, LQD and SIC. BETA, GRWT and MVBV are significant at 5%.

The parametric tests indicate that GEAR is not significant although it has the expected sign. The direction of the relationship with BETA indicates that higher levels of systematic risk motivate management to disclose IC. In line with agency theory, management provide VDIC in an attempt to mitigate the risk of uncertainty inherent in IA investments, and thus reducing asymmetry of information. In the presence of high market risk and reduced liquidity risk, GEAR is not a significant component of firm-specific risk that positively influences VDIC. The univariate analysis supports the hypothesis of high growth companies disclosing IC. Such disclosure signal success and sustain growth by informing the markets of management’s ability. Successful management practices and investment in IC are attributed as the driving force behind company growth. As such, it may be expected that companies with higher MVBV are associated with higher levels of VDIC; the lack of a conduit for reporting IC leads companies to disclose IC in the narratives, non-narratives and illustrations that are able to communicate qualitative and quantitative IC information that is not included in the audited financial statements of the company. Table 5.1 confirms that size, as measured by TA, is positively associated with VDIC consistent with MV as reported in Table 4.4. On the one hand, the results indicate that TA as a size proxy is associated with high

disclosing companies; on the other hand, the results suggest that there may be no grounds to expect asset intensive companies not to disclose IC. Consistent with Table 4.4, industry membership influences disclosure; this is evident in the association between VDIC and SIC.

In Table 5.1, the correlation matrix indicates results that are consistent with the partial correlation matrix. Nevertheless, the association with liquidity is weaker. Although the levels of association are well below the research parameters, they are of interest as they signal potential influences when the non-parametric tests are conducted. With the exception of GEAR and LQD, results are significant at 5% and consistent with the results of the partial correlation matrix. Nevertheless, although significant, none of the coefficients is of great concern as the highest correlation between WDI and TA is +0.31 at 1%. In addition, investigation of the inter-collinearity between the variables themselves reveals similar results that BETA is significantly correlated at 5% to LQD and GEAR. This result is consistent with the approach adopted by Abdelghany (2005, p.868), as beta is a measure of market risk, if an accounting determined risk measure is found not to be associated with market-based beta, the relevance of employing such a measure may be questioned (Beaver *et al.* 1970, p.655). The correlation of these variables in Model II, suggests that the inclusion of these variables as measures of risk may be justified. In addition, results indicate that risk may be industry specific with respect to the SIC industry variable. BETA and SIC are associated at 5%, suggesting that high technology and innovative companies are associated with higher levels of systematic risk. Both GRWT and MVBV have been associated with IA generation. The results are consistent with the predicted sign; high growth companies that have significant IA in their equity tend to disclose IC.

The relationship between TA and SIC suggests that increasing technologically innovative processes are conducted by smaller companies. High levels of liquidity are associated with higher market risk that may be attributed to companies with higher growth rates. However, the results suggest that those companies with higher levels of liquidity are associated with the more basic industries. Service orientated and high technology companies may be associated with less liquidity. Overall, associations are significant at 5%; the

direction of the relationships between WDI and the independent variables is consistent with the TF and the direction of the hypotheses that were developed.

Table 5.2 presents the results of the descriptive statistics by industry. The results indicate that tangible assets are more dominant in the basic and engineering industries, whereas computer and retail industries have fewer tangible assets associated with them as illustrated by the TA variable. The investment in IC is expected to result in high levels of market risk due to the hidden value associated with companies in the pharmaceutical and computer industries as illustrated by beta and SIC. A more tangible resource base as represented by basic and retail industries is associated with lower levels of market risk due to easier measurement, valuation and reporting associated with these tangible assets.

Table 5.2 Descriptive statistics by industry

Industry Group	SRWDI	LNTA	BETA	LQD	GEAR	SRSIC	GRWT	MVBV
Mean								
BASIC	0.510	6.302	0.763	0.781	0.345	54.061	0.085	2.462
CHEM	0.488	5.836	0.965	1.002	0.323	56.590	0.010	2.616
ENG	0.490	6.332	1.155	0.898	0.384	54.826	0.056	2.456
ELEC	0.595	6.047	0.939	1.794	0.336	59.414	0.108	2.671
PHAR	0.700	5.828	1.120	2.546	0.232	49.406	0.455	5.128
RET	0.493	5.622	0.881	0.670	0.295	72.348	0.164	3.067
COMP	0.600	5.246	1.123	1.222	0.329	85.898	0.169	3.134
SERV	0.602	6.095	0.872	0.676	4.871	89.436	0.127	2.234
Standard deviation								
BASIC	0.115	1.780	0.291	0.445	0.241	15.310	0.115	12.732
CHEM	0.113	2.029	0.356	0.729	0.222	10.922	0.111	3.535
ENG	0.101	2.112	0.400	0.432	0.186	3.366	0.093	3.103
ELEC	0.117	2.604	0.521	2.163	0.296	5.739	0.362	3.903
PHAR	0.076	2.705	0.386	2.141	0.234	0.000	0.594	3.869
RET	0.096	1.916	0.372	0.372	0.253	1.084	0.537	4.111
COMP	0.103	1.949	0.449	1.384	0.747	0.492	0.389	8.311
SERV	0.101	1.820	0.357	0.388	34.026	7.328	0.208	4.501

Source: Descriptive statistics on research data

Financial risk on the other hand is associated with industries with less liquidity and more debt as illustrated by the service and retail industries;

whereas, pharmaceutical and electrical industries are the more financially stable sectors. Confirmation of the variation of VDIC with industry trends is provided by SRSIC that illustrates that IC disclosure increases as economic activity increases from basic to complex. Furthermore, the association between GRWT and MVBV is evidenced by pharmaceutical and computer companies that have the highest growth rates and the highest MVBV ratios. The next sections discuss the results of the non-parametric tests in the multivariate analysis.

5.3.0. Multivariate Analysis

Despite the results of the correlation coefficients illustrating the absence of significant collinearity, a certain degree of association may exist given that one independent variable may be an approximate linear function of a set of several independent variables. This research therefore applies a sensitivity test as an effective test of multicollinearity: the variance inflation factor (VIF). This factor is reported in Table 5.3; collinearity does not appear to be a serious problem in Model II as the highest factor does not exceed 10. Consistent with the methodology employed in Cooke (1998) such normally distributed residuals may provide a robust result. There is therefore no need for the exclusion of outliers. This approach maintains the integrity of the data and therefore provides results that are more consistent with the characteristics of the variables. A robust linear regression is run on the independent variables. The F – statistic 28.44 is significant at 1% and indicates a linear relationship. The value of R^2 is 0.20; overall, the model appears robust, as the size of the sample is large (439 observations). The large F -statistic indicates that the linear equation fits the model. Overall, the model appears robust; the sample size is large (439 observations). This research formulates a one-sided test as a statistical hypothesis in which the coefficients for which we can reject the null hypothesis, $H_0 > 0$. This research formulates the null hypothesis to determine if Model II has any explanatory power.

$$H_0: \text{all coefficients are } < \text{“0”}$$

In order to decide whether the null hypothesis is rejected, the value of F necessary to reject the null hypothesis is determined.

Table 5.3 OLS Regression for the Model II: Financial Measures of Risk

Model	2.1	2.2	2.3	2.4	2.5
Dependent variable	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI
Independent variables					
CONSTANT	0.277*** (8.04)	0.246*** (7.10)	0.254*** (6.65)	0.262*** (7.56)	0.244*** (8.74)
LNTA	0.022*** (7.52)	0.024*** (8.37)	0.026*** (7.93)	0.022*** (7.69)	0.024*** (10.50)
BETA	0.023* (1.89)	0.029** (2.10)		0.037*** (2.63)	0.034*** (3.09)
LQD	0.015*** (4.14)	0.014*** (3.09)	0.017*** (3.27)		0.013*** (4.00)
GEAR	-0.00*** (4.83)	-0.00*** (4.17)	-0.00*** (7.79)	-0.00*** (3.80)	
SRSIC	0.015*** (4.67)	0.002*** (4.69)	0.002*** (4.47)	0.002*** (4.54)	0.002*** (5.71)
GRWT	0.037* (1.76)	0.042** (2.88)	0.047*** (2.90)	0.045** (2.55)	0.041*** (3.54)
MVBV	0.001*** (3.57)	0.002** (2.39)	0.001* (1.83)	0.002** (2.52)	0.002*** (3.00)
Mean VIF	1.06				
Z	0.21				
F ¹	28.44***				
R ² (adjusted or pseudo) ¹	0.20	0.12	0.12	0.10	0.12
N	439	439	439	439	439

VIF Variance inflation factor
Z OLS specifications reported normal residuals ($z = 0.21$) and these models (2.2 to 2.5) were re-specified using quantile regression. 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; *** $p < .01$; ** $p < .05$; * $p < .10$

This research rejects H_0 when $F_{\text{observed}} > F_{\text{critical}}$. Thus $F_{(0.05, 7, 439)} = 1.96$. This research therefore rejects the null hypothesis that all the variables jointly have no explanatory power in the model. As $F > F_{\text{critical}}$, H_0 is rejected and this research concludes that Model II has some explanatory power. In addition, the adjusted R^2 of 0.20 for the regression indicates that the variables TA, BETA, LQD, GEAR, SIC and MVBV are significant in explaining the variation in VDIC. Note that the coefficients of these independent variables are statistically

significant at 1%. BETA and GRWT show a weak association with VDIC. Within the OLS model, GEAR is significant in the multivariate analysis and not in the univariate analysis. This change is matched by a reduction in the strength of the relationship between BETA and IC disclosure; this result suggests that GEAR and LQD are sufficient in explaining financial risk associated with VDIC. The sensitivity test represented by the QREG provides supporting and better results for the hypothesised influence of selected variables although the explanatory power of the model overall appears reduced. All variables reported are significant; however, GRWT is not significant in the OLS model; nevertheless, both the partial correlation and the correlation matrix provide evidence of a positive significant association.

The results of the OLS model are robust and generally consistent with the results of the univariate analysis. The *F*-statistic is significant at 1%, the VIF factor illustrates the absence of multicollinearity amongst the variables included in the model and the *z*-statistic indicates that residuals are normally distributed. The next section discusses the results of the independent variables and the hypotheses that are developed in the empirical tests.

5.3.1. Size

This model confirms that large companies provide more VDIC than smaller companies. The results are consistent with Model I, the partial correlation matrix, the Pearson correlation matrix and the QREG model. In the Camfferman and Cooke (2002) study, the TA figure, as the measure of size, is significant with a positive coefficient. The positive association may be attributed to various forces that have been discussed in the literature including high risk of political costs, relative costs of disclosure, lower transaction costs, increasing agency and decreasing competitive cost. This model applies signalling as the theoretical basis of the relationship. The perceived benefits of reporting IC are expected to outweigh the potential disclosure costs arising from political costs. Model II confirms this theoretical approach. The existence of superior resources, policies and procedures that lead to above average returns are sufficient motivation to herald this competitive advantage through signalling. The motivation may be attributed to characteristics associated with

larger companies; benefits of signalling, mediation by larger numbers of analysts, lower information production costs, benefits of highly skilled individuals who facilitate the disclosure, stakeholders that may demand more information, benefits of lower finance costs, benefits from economies of scale, benefits of equity tradability and benefits of market liquidity.

Size as measured by TA has been confirmed as a significant positive variable in Singhvi and Desai (1971, McNally *et al.* (1982), Cooke (1989 and 1991) and Camfferman and Cooke (2002). Although, size as measured by SALES is reported as negative by Wallace (1987), size as measured by TA was found to be significant in the same research. Within the IC field, it may be expected that companies that are more capital intensive may disclose less IC as production may be generated by applying mainly tangible assets. However, the results reject this approach. Size appears to be an important explanatory variable whether measured by TA or MV (Hossain *et al.* 1994 and Lang and Lundholm 1993). The direction of the variable is consistent with the expected sign; the motivations are derived from signalling theory. This research accepts that TA is a significant positive variable on the extent of VDIC in Model II.

H1.3: Size as measured by TA is a positive significant explanatory variable of the variation in the extent of VDIC.

5.3.2. BETA

Model II indicates that market risk BETA may be an insignificant factor in the VDIC decision. The results of the OLS model are inconsistent with the univariate analysis, the Pearson correlation matrix and the QREG model that report a positive influence of BETA on VDIC. This research concludes that the relationship between BETA and VDIC may be weak. The literature indicates that Firth (1984) in the UK found the association of voluntary disclosure and earnings BETA to be insignificant in manufacturing companies. The expectation is that a high-risk status may be edited or not disclosed at all. Unmanaged and maximum disclosure of a high systematic risk status may lead to a reduced share price and ultimately management replacement. As such, these actions allow management to perpetuate their positions at the expense of

shareholders and the market at large. The motivations are based on agency theory. The results indicate that the level of BETA does not influence managers to alter disclosure practices; other factors that management takes into account may be more significant. As indicated in Table 5.2, LQD and GEAR are the more important determinants of equity risk in the IC disclosure decision. The expectation of a significant association has not been realised with respect to the OLS model, however the better results presented by the QREG model suggest that the relationship between BETA and VDIC is significant and positive. A high BETA may motivate management to increase VDIC in an attempt to mitigate exposure to market risk. By informing the markets and shareholders of IC within the company, management expect to reduce the risk associated with the company by reducing uncertainty as to its “hidden value” and potential. These results are consistent with those of Foster (1978) who found significant correlation between accounting annual report disclosure and systematic risk. Nevertheless, following the first approach, a high-risk status is expected to result in increased IC attributes disclosure as management attempt to reduce share price fluctuations by illustrating the “hidden value” and reducing uncertainty. This result confirms the hypothesis that is based on agency theory; hypothesis H4.1: is accepted.

H4.1: BETA is a positive significant explanatory variable of the variation in the extent of VDIC.

5.3.3. Liquidity (LQD)

Companies characterised by high levels of LQD tend to disclose more IC. This result is consistent with the partial correlation matrix, the OLS and the QREG model that report similar results. The results indicate that only those companies able to honour their short-term obligations as they fall due without recourse to selling other assets in place (Wallace and Naser 1995) are capable of VDIC. Liquidity provides the necessary cash flow required for IC investment activities, some of which require large capital outlays before any returns can be realised. Within the first approach, companies with higher levels of liquidity (LQD) may be expected to signal successful cash flow management through

increasing VDIC. In addition, the existence of liquidity indicates availability of financial resources necessary for investment in IC. Explanations for this association are based on signalling theory, consistent with management's intentions to indicate the underlying reality and to influence stakeholders. This view is based on the expectation that a financially strong company is more likely to disclose more information than a weak one. Such companies are, therefore, more likely to give more information to differentiate themselves from their competitors.

Few authors have found liquidity to be significant in their studies on voluntary and mandatory disclosure; however, the choice of proxy (quick ratio) and the nature of the disclosure index (IC) may be the reason for the significant results in this research. Although the results of the Camfferman and Cooke (2002) indicated that in the UK liquidity as measured by the current ratio is insignificant in explaining the variation in disclosure, liquidity also measured as current ratio was found to be positive and significant in the Netherlands. The results of this study appear robust due to the methodology applied here and adopted from Cooke (1998). Generally, the results on liquidity as illustrated in Appendix 1A, indicate insignificant relationships between liquidity and disclosure, these results are insignificant in different countries and different industries and in both voluntary and mandatory disclosure. The exceptions are Wallace *et al.* (1994) for Spain, who found a negative significant relationship and Camfferman and Cooke (2002) for the Netherlands, who applied the current ratio, and found a positive significant relationship and in a study by Cooke (1989) in which a higher liquidity in companies is associated with increased disclosure. Model II confirms this result. Agency theory supports that management are expected to increase disclosure if cash flow management is favourable and suppress disclosure if liquidity is negative. In this way, liquidity may be considered a performance measure given that low performance may result in management displacement and or a reduction in remuneration or performance based bonuses. Thus applying agency theory to explain management behaviour, the expectation of a positive significant association between LQD and VDIC is accepted. Consistent with the approach based on signalling theory, low LQD leads to lower VDIC levels and higher LQD may lead to more investment in IC and therefore higher levels of VDIC as

management attempt to perpetuate company standing and reputation. As such, companies with higher levels of LQD may be expected to signal successful cash flow management through VDIC. High LQD levels may result in IC investment, rendering disclosure supported. Consistent with signalling theory it may be confirmed that LQD is positively associated with VDIC.

H4.3: LQD ratio is a positive significant explanatory variable of the variation in the extent of VDIC.

5.3.4. Gearing (GEAR)

Model II indicates 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. Due to the lack of tangible security, companies investing in IA are limited in their access to financial resources. The results confirm that highly geared companies do not disclose ICCA. The financial risk associated with such debt levels does not motivate management to increase 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. Management may reduce VDIC to facilitate project turnaround tactics that may sustain their positions and /or sustain shareholder perceptions of management's success. 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.

Thus, an increase in the gearing ratio (GEAR) increases the probability of financial and insolvency risk. As such, highly geared companies may not have the financial resources required firstly for investment in IC; secondly, highly geared companies may not have the necessary resources for investment

in the processes and procedures required to identify, manage and report IC. Proponents of agency theory view 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 accepted as security as such, debt may be associated with more tangible asset based companies that are less likely to report IC. In addition, Williamson (1988) concluded that debt providers might be unwilling to finance projects with high company specificity; IA, including internally generated services, processes and products, have such reduced tradability as they are unique, inimitable and require substantial investment and expertise to develop. Research evidence has shown that R&D of a company is negatively related to its debt levels (Balakrishnan and Fox 1993 and Baysinger and Hoskisson 1989). This evidence is consistent with R&D as the driver of IA growth without which there is likely to be reduced levels of VDIC.

The literature provides evidence that a higher incidence of agency costs is associated with companies with a greater proportion of debt (Leftwich *et al.* 1981, p.56). This is consistent with Jensen and Meckling (1976) who suggest that companies with high gearing costs may incur higher monitoring costs. Gray and Roberts (1989) found a negative significant result between mandatory and voluntary disclosure with gearing in a study conducted in the UK. From an international perspective, Meek *et al.* (1995) and Eng and Mak (2003) identified gearing as negatively affecting the extent of voluntary disclosure. The results are consistent with Balakrishnan and Fox (1993) and Baysinger and Hoskisson (1989) who find that highly geared companies have less R&D investment that may lead to less IC disclosure. The arguments are based on agency theory; management may decrease VDIC; by increasing asymmetrical information management are able to perpetuate their positions in office. Furthermore, 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. This research concludes that in Model II, hypothesis H4.4: is accepted.

H4.4: Highly geared companies are more likely to provide less VDIC than less geared companies are.

5.3.5. SIC

The UK SIC of Economic Activities (National Statistics 2003) is used to classify business establishments by the type of economic activities they are engaged in. Model II indicates that this ascending industry classification ranging from 0100 basic agriculture industry to 9000 complex service industries is statistically significant at the 1% level with WDI in the partial correlation, the Pearson correlation, the OLS model and the QREG model. Due to the increasing IC content in ascending SIC code, the expectation of a relationship with WDI is confirmed. Forestry and paper, food producers and processors, beverages and tobacco, the most basic industries disclose little ICCA whereas the telecommunications, media and entertainment, health, leisure and hotels, the more complex service industries disclose more ICCA.

Certain service and highly complex companies are expected to apply IA and IC, unique to their organisation and therefore not easily replicable. The benefits of disclosure of ICCA may outweigh the disclosure costs that may be associated with the disclosure of proprietary information. These companies may disclose ICCA attributes due to the lack disclosure costs that may normally be associated with competitors; such competitors may be limited in their ability to access this industry due to the high barriers to imitation attributed to the necessary financial, innovative and HC resources. Archambault and Archambault (2003) and Citron *et al.* (2005) find a strong positive association between disclosures and the number of SIC codes in the firm indicating that operating in a large number of distinct industries may lead to increased disclosure as companies seek to obtain a greater set of resources (Zarzeski 1996) or because of increased diversification (Verrecchia 1983). More complex service orientated companies may be disadvantaged by the current reporting regime. This current reporting framework is biased for companies whose equity

is mostly intangible. This value is therefore not represented in the financial statements. VDIC provides the means for such companies to signal their growth potential and signal the underlying reality. The conclusion for this variable therefore is that hypothesis H3.4: is accepted.

H3.4: SIC is a positive significant explanatory variable of the variation in the extent of VDIC.

5.3.6. Growth (GRWT)

The expectation of growth companies disclosing IC has been partially validated; the relationship is weak with respect to the OLS model. Nevertheless, the univariate analysis, the Pearson correlation matrix and the QREG model confirm that the growth of companies associated with “hidden value” are associated with the signalling of IC attributes. This research concludes that growth companies that are embedded with IA tend to disclose IC. Higher growth companies may have higher information asymmetry between management and investors and thus may provide incentives to narrow this information gap through VDIC. This result is consistent with Del Monte and Papagni (2003) who maintained that companies with a strong commitment to R&D have a higher rate of growth. Furthermore, the results suggest that higher GRWT leads to more voluntary disclosure as management signal the realisation of company potential previously held in IA and that may be reflected in a higher MVBV ratio. Management of high GRWT companies may disclose ICCA to indicate company success (economic theory), management expertise and competence (agency theory) and to maximise shareholder value in the markets (shareholder maximisation). The literature has revealed varying results. Lev and Stefano (2003) believe that the major drivers of company GRWT are IA. Such IA consist of IC in the form of innovation, information and communication technologies, networks and alliances, the quality of human resources and management processes continue to be vital to companies. Lee and Shim (1995) established a positive relationship between R&D expenditures and a company's market growth in Japan. McNally *et al.* (1992) reported an insignificant result, for voluntary disclosure of non-financial and non-retail

companies listed in New Zealand. Similarly, Eng and Mak (2003) reported an insignificant GRWT variable. In contrast, however, Prencipe (2004) in a study of 65 Italian listed companies identified a negative significant relationship between voluntary disclosure and the growth rate. Nevertheless, Model II indicates that growth opportunities translate into VDIC as management signal superior performance. Furthermore, investment in growth requires development of markets, products and customers areas that are closely related to investing in RC. Thus, the hypothesis based on signalling theory has been confirmed. In Model II hypothesis H2: is accepted.

H2: GRWT is a positive significant explanatory variable of the variation in the extent of VDIC.

5.3.7. MVBV

Model II confirms that companies with higher levels of “hidden value” disclose more IC than those companies associated with less intangible value. The theoretical relationship is supported by signalling theory that explains management’s actions for increasing the value relevance of the financial statements. As information asymmetry may be high, VDIC may reduce agency costs. Lang and Lundholm (2000) report that companies with increasing levels of disclosure experience significant price increases, and Healey and Palepu (1993) report that increased disclosure leads investors to revise upwards their valuation of a company’s shares. Edvinsson and Malone (1997) define the difference between a company’s BV and MV as the value of IA. To match the equity market, management may be expected to provide VDIC to bridge the gap created by this difference with historical financial statements. Support for a positive association is derived from Garcia-Meca *et al.* (2005) that confirm MVBV as a positive significant variable in the voluntary disclosure of presentations to analysts. This research concludes that the benefits of signalling outweigh disclosure costs. These disclosure costs are attributed to competitive losses that may ensue because of IC disclosure. The results indicate that the “hidden value” may be represented by the difference between book and market value. Brennan (2001) recognises that the difference may not be due wholly to

undisclosed IC. Book values may be unrealistic as tangible assets may not have been re-valued to replacement cost (Lev 2001). Furthermore, book values are calculated based on accounting standards, the application of which can differ from company to company. In addition, fluctuations in the share price may render market value an unreliable measure of IC in the short term; finally, a multitude of factors has a significant influence on the share price.

Nevertheless, despite these shortcomings in the MVBV proxy the results of the partial correlation, Pearson correlation, OLS model and QREG model indicate consistent results. Edvinsson and Malone (1997) define the difference between a company's BV and MV as the value of IC. This value remains hidden due to the inability of traditional financial statements to report SC, RC and HC. The results indicate that IC intensive companies, that are likely to have a larger difference between MV and BV, have more incentives to signal these investments in IA that may otherwise remain invisible to shareholders and investors. Dzinkowski (2000) suggest that VDIC is likely to be higher where MVBV ratio is larger as illustrated by the pharmaceutical and computer industries in Table 5.2. Nevertheless, Lev (2001) suggests certain ways in which voluntary disclosure may mitigate the shortfalls within the traditional reporting framework. Although market and accounting valuations may differ, the results indicate that greater VDIC may lead to accurate predictions of future earnings (Leuz and Verrecchia 2000). These future earnings are associated with market value that accounts for both tangible, intangible assets and growth prospects (Frankel *et al.* 1999). Healey and Palepu (1993) suggest that as the market accounts for sources of IA value not recognised on the balance sheet, greater IC disclosure may lend itself well to a rise in equity valuations, increased liquidity and tradability and decreased cost of capital (Botosan 1997).

The main concern with bridging the MVBV gap is the reliability and objectivity of estimates required for capitalisation of IA. In the absence of this reliable information, signalling theory suggests that management may be motivated to disclose more IC as narratives, non-narratives and illustrations when the MVBV 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. These companies are expected to disclose the investment that would otherwise remain invisible to shareholders and stakeholders alike. The conclusions offer support for the arguments drawn from information asymmetry, the RBV and signalling theory; the existence of “hidden value” leads to company IC disclosure aimed at signalling the real drivers of value. MVBV is a significant positive variable on the extent of VDIC therefore hypothesis H5.3: in Model II is accepted.

H5.3: MVBV is a positive significant explanatory variable of the variation in the extent of VDIC.

5.5.0. Conclusion

The objective of the empirical tests is to establish a relationship between VDIC and BETA, GEAR and LQD. In general, various components of risk are significant in influencing the variation in VDIC. High financial risk as measured by LQD and GEAR leads to lower levels of VDIC. BETA on the other hand, indicates that market risk is a positive determinant of the variation in VDIC. Although the relationship is weak in the OLS model, the partial correlation matrix, the Pearson correlation matrix and the QREG model reports a significant association between BETA and VDIC. A robustness check on the composition of the model by application of the pairwise tests confirms that BETA is significantly correlated at 5% to GEAR and LQD providing collaborating evidence for inclusion of these proxies as measures of risk. This research concludes that larger more financially stable companies that are characterised by reduced insolvency and liquidity risk are more likely to disclose IC given that their “hidden value” is larger, as evidenced by their higher MVBV ratio and by their membership of more complex service industries.

6. Industry Membership

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6.1.0. Introduction

The multiple regression model is estimated using four industry membership variables.

$$WDI = \beta_0 - \beta_1 GEAR + \beta_2 MVTA + \beta_3 INDG - \beta_4 MANUF + \beta_5 SIC + \beta_6 TMRK + \beta_7 SIZE + \varepsilon \quad (6)$$

The objective of the empirical tests in Model III is to establish a relationship between VDIC and industry membership. Chapter 2 outlines the development of the industry hypotheses. The seven variables introduced are TMRK, MANUF, INDG, SIC, SALES, MVTA and GEAR that are discussed in Table 2.1 the analytical framework. The development of the model has been discussed in section 3.2.3. This chapter provides a further sensitivity test in addition to that of the QREG model. Dummy industry variables are introduced into both the OLS and the QREG models to determine the influence of selected industry membership variables on the significance of SALES, MVTA and GEAR. In this way, groups of industries combined in these dummy variables may provide evidence of which industries are most associated with VDIC. The dummy variables listed in Appendix 2B consist of basic, chemical, engineering, electrical, pharmaceutical, retail, computer and services. The results of the dummy variables are included in the multivariate analysis. Consistent with Cooke (1998), transformations are applied to non-normal variables before regression tests. The choice of approach to accounting for statistical problems associated with non-normal distributions has been discussed in Chapter 3. The possible existence of multicollinearity is tested using two methods. The next section examines the level of association of variables included in Model III. Subsequent sections discuss the results of the empirical tests.

6.2.0. Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Low coefficients in the correlation matrix suggest that there may be no collinearity problem. However, a certain degree of multicollinearity may still exist even when none of the bivariate correlation coefficients is large. As

Table 6.1 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Variable	Mean	SD	Minimum	Max	COR	A	B	C	D	E	F	G	H
A SRWDI	0.561	0.118	0.265	0.866	1	1							
B	5.811	2.013	0.501	11.404	0.426***	0.278***	1						
LNSALES													
C TMRK	0.164	0.371	0.000	1.000	0.216***	0.217***	-0.28***	1					
D MANUF	0.476	0.500	0.000	1.000	-0.105**	-0.23***	0.239***	-0.32***	1				
E INDG	80.970	35.234	30.000	157.000	0.118**	0.264***	-0.110**	0.382***	-0.42***	1			
F SRSIC	71.609	16.575	14.213	95.969	0.131***	0.165***	-0.14***	0.032	-0.45***	0.286***	1		
G MVTA	1.164	1.180	0.070	10.880	0.147***	0.144***	-0.23***	0.240***	-0.26***	0.172***	0.040	1	
H GEAR	0.931	12.379	-6.820	259.530	-0.050	-0.023	0.062	-0.025	0.053	0.016	0	-0.04	1

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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;

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

MANUF: dichotomous variable that scores “1” for manufacturing and “0” for non-manufacturing;

INDG: this variable returns the DataStream level 6 industrial classification number;

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

MVTA: ratio of market value to total assets

GEAR: $\text{total debt} / \text{total capital \%} (\text{long-term debt} + \text{short-term debt} + \text{current portion of long-term debt}) / (\text{total capital} + \text{short-term debt} + \text{current portion of long term debt}) * 100;$

indicated in Models I and II, the VIF is applied as the second test to compute the level of multicollinearity (Table 6.3). The results of this test are reported in Table 6.1. This section examines the descriptive statistics, the partial correlation coefficients and the Pearson correlation matrix. The descriptive statistics indicate that 16% of the sample companies are listed on the TechMARK exchange and that 48% of companies are manufacturing. The ratio of MVTA is 1.16, it indicates that TA is as representative a proxy for size as is MV. Furthermore, the mean value for MVTA indicates that on average the sample MV exceeds TA by 16%. However, the minimum and maximum values for MVTA indicate that the “hidden value” varies from a fraction of the TA value to over ten times the value of TA. Industry variables INDG and SIC indicate a wide range of economic activities within the sample as illustrated by the minimum and maximum values. The partial correlation results (Table 6.1) illustrate the nature, direction and significance of the bivariate relationships of WDI and the independent variables. A significant correlation at 1% is found between WDI and SALES, TMRK, SIC AND MVTA whereas MANUF, INDG, are significant at 5% and GEAR is insignificant in the univariate analysis. Thus with the exception of GEAR the direction and significance of the variables in the parametric results of Model II are consistent with the predicted sign.

The size variable is a significant determinant of VDIC whether measured by TA, MV or SALES. GEAR is included as a measure of financial risk that accounts for the variation in the extent of disclosure that may be attributed to agency costs. The partial correlation results indicate that gearing may be unimportant in the disclosure decision. The existence of “hidden value” accompanied by large sales revenue is sufficient motivation for companies in high technology and innovative industries to disclose IC. It may be that these companies do not rely on debt to finance their operations due to the lack of adequate debt security and the specificity and non-tradability of their assets. The results of the partial correlation are supported by the Pearson correlation matrix. Although some of the coefficients are correlated, none of these coefficients is of great concern as the highest correlation between MANUF and SIC is -0.45 at 1%. The results of the coefficients with respect to significant associations with TMRK include certain non-manufacturing companies as

reported by a negative coefficient for MANUF, INDG, indicating a positive association consistent with ascending complexity, and MVTA, consistent with “hidden value” within high technologically innovative companies. This association is supported by the negative significant coefficient between MANUF and MVTA that indicates that non-manufacturing companies are associated with higher levels of “hidden value”. The direction of the association between INDG and SIC indicates the consistency of the two classifications in the measurement of innovation, complexity and technology. Overall, the results of the Pearson correlation matrix are consistent with the partial correlation coefficients. In addition, the relationship between variables is consistent with the overall understanding of the underlying theoretical approach.

Table 6.2 Descriptive statistics by industry

Industry Group	SRWDI	LNSALES	TMRK	MANUF	INDG	SRSIC	MVTA	GEAR
Mean								
BASIC	0.510	6.481	0.000	1.000	52.339	54.061	0.861	0.345
CHEM	0.488	5.936	0.000	0.480	51.840	56.590	1.224	0.323
ENG	0.490	6.529	0.465	1.000	60.116	54.826	0.726	0.384
ELEC	0.595	5.778	0.340	0.660	88.620	59.414	1.013	0.336
PHAR	0.700	5.126	0.769	0.000	123.615	49.406	2.865	0.232
RET	0.493	6.043	0.021	0.319	79.255	72.348	1.268	0.295
COMP	0.600	5.231	0.248	0.000	95.950	85.898	1.291	0.329
SERV	0.602	5.915	0.121	0.759	88.414	89.436	1.141	4.871
Standard deviation								
BASIC	0.115	1.749	0.000	0.000	20.551	15.310	0.416	0.241
CHEM	0.113	1.930	0.000	0.510	18.865	10.922	1.186	0.222
ENG	0.101	1.979	0.213	0.000	24.771	3.366	0.526	0.186
ELEC	0.117	2.447	0.479	0.479	45.016	5.739	1.012	0.296
PHAR	0.076	3.032	0.439	0.000	32.170	0.000	2.601	0.234
RET	0.096	1.934	0.146	0.471	11.558	1.084	1.316	0.253
COMP	0.103	1.855	0.434	0.000	34.376	0.492	1.189	0.747
SERV	0.101	1.729	0.329	0.432	29.046	7.328	1.256	34.026

Source: Descriptive statistics on research data

Table 6.2 presents the results of the descriptive statistics by industry. The size variable LNSALES indicates that both tangible and IA based resources

are instrumental in generating turnover. However, whereas pharmaceutical and computer industries are associated with higher levels of MV, these industries are associated with lower levels of turnover. Basic and engineering industries that were previously associated with less MV, are now associated with higher levels of turnover. This result is confirmed by the MVTA variable that illustrates that pharmaceutical and computer sectors have the higher levels of “hidden value” and lower levels of gearing. Industry variables, TMRK and MANUF indicate that non-manufacturing companies in pharmaceutical and computer sectors are associated with higher levels of VDIC. INDG reflects these trends, as companies with larger IA in their resource base are found to be more complex and more innovative consistent with the results of SRSIC. The next sections discuss the results of the regression equation in this model.

6.3.0. Multivariate Analysis

Consistent with Models I and II, two tests of collinearity are applied to ensure that no one variable may be an approximate linear function of a set of several independent variables. The results of the VIF are reported in Table 6.3; collinearity does not appear to be a serious problem in Model III, as the highest factor does not exceed 10. Consistent with the methodology employed in Cooke (1998) such normally distributed residuals may provide robust results. There is therefore no need to exclude outliers. Table 6.3 presents Model III, the regression of WDI and the four industry variables. A robust linear regression is run on the independent variables. The F – statistic 40.5 is significant at 1% and R^2 is 0.27. This research formulates a one-sided test as a statistical hypothesis in which the coefficients for which we can reject the null hypothesis, $H_0 > 0$. This research formulates the null hypothesis to determine if Model III has any explanatory power.

$$H_0: \text{all coefficients are } < \text{“0”}$$

In order to decide whether the null hypothesis is rejected, the value of F necessary to reject the null hypothesis is determined. This research rejects H_0 when $F_{observed} > F_{critical}$. Thus $F_{(0.05, 7, 439)} = 2.03$. This research therefore rejects

Table 6.3 OLS Regression for the Model III: Industry Membership

Model	3.1	3.2	3.3	3.4
Dependent variable	SRWDI	SRWDI	SRWDI	SRWDI
Independent variables				
CONSTANT	0.299*** (7.92)	0.321*** (13.44)	0.297*** (6.65)	0.514*** (10.47)
LNSALES	0.026*** (9.85)	0.025*** (10.77)	0.026*** (7.86)	0.027*** (7.43)
MVTA	0.014*** (3.25)	0.015*** (3.55)	0.018*** (3.11)	0.013** (2.04)
GEAR	-0.000*** (-6.76)	-0.000*** (-10.73)	-0.000*** (-5.36)	-0.000*** (-6.40)
TMRK	0.070*** (4.65)		0.077*** (4.00)	
MANUF	-0.027** (-2.09)		-0.032** (-2.01)	
INDG	0.000** (2.45)		0.000* (1.85)	
SRSIC	0.001** (2.59)		0.001** (2.03)	
BASIC		0.014 (0.63)		-0.186*** (-4.13)
CHEM		(dropped)		-0.234*** (-4.70)
ENG		-0.005 (-0.24)		-0.210*** (-4.48)
ELEC		0.115*** (4.77)		-0.096** (-2.09)
PHAR		0.208*** (8.41)		(dropped)
RET		0.003 (0.11)		-0.218*** (-4.76)
COMP		0.128*** (6.61)		-0.077* (-1.83)
SERV		0.118*** (5.54)		-0.094** (-2.09)
Mean VIF	1.29	2.30		
Z	0.20	0.33		
F ¹	40.50***	53.43***		
R ² (adjusted or pseudo) ¹	0.27	0.39	0.15	0.24
N	439	439	439	439

VIF Variance inflation factor
Z OLS specifications reported normal residuals ($z = 0.20$) and these models (3.2 to 3.4) were re-specified using quantile regression. 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; *** $p < .01$; ** $p < .05$; * $p < .10$

SR Variables transformed by square roots are prefixed with SR;

LN 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;

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

MANUF: dichotomous variable that scores "1" for manufacturing and "0" for non-manufacturing;

INDG: this variable returns the DataStream level 6 industrial classification number;

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

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;

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;

the null hypothesis that all the variables jointly have no explanatory power in the model. As $F > F_{critical}$ H_0 is rejected and this research concluded that Model III has some explanatory power. In addition, the adjusted R^2 of 0.27 for the regression indicates that the variables SALES, TMRK, MANUF, INDG, SIC, MVTA and GEAR are significant in explaining the variation in VDIC. Note that the coefficients of these independent variables are statistically significant at 5%. The multivariate analysis indicates that VDIC is influenced by all variables included in the model. The high F -statistic indicates a strong linear relationship between these variables and VDIC. The results of the QREG model is consistent with the OLS model, however the variation in INDG between the two models is not material given the significant associations reported in the partial and Pearson correlation matrices. Significant for the multivariate analysis, is the negative significant relationship between VDIC and GEAR that was reported as insignificant in both the partial and Pearson correlation matrices. This research proposes that in the presence of “hidden value” large companies with low debt levels operating in high technology and innovative industries provide a high level of IC disclosure.

Model III appears to be robust; the results of the four industry classifications have provided significant results, consistent with the theoretical approach based on the RBV and signalling theory. The dummy variables on the other hand provide more interesting and more detailed results. First, the explanatory variables SALES, MVTA and GEAR remain significant irrespective of whether industry classifications are applied or dummy industry variables are applied. Second, industry variables TMRK, MANUF, INDG and SIC are consistent in basing their association with VDIC on ascending TechMARK listing membership (i.e. increasing third party recognition of IC content), on increasing non-manufacturing (MANUF) economic activity, on increasing complexity in INDG and on increasing service activity in SIC. Both the OLS and QREG models provide consistent results with respect to these industry variables nevertheless, it is noted that INDG provides a weaker result in the QREG model. Third, certain dummy variables, for example electrical and services are significant in both the OLS and QREG modes. Fourth, 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

electrical 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. Fifth, consistent with four above, although coefficients of the dummy variables in the QREG model are negative, this research examines the order in the size of the coefficients to establish their relative positions in their influence on VDIC. Considering only the significant results and the highest coefficients, pharmaceuticals is the industry that discloses the most IC attributes under the OLS model and services under the QREG model. Overall, the OLS model is more robust than the QREG model with respect to the value of R^2 , although all variations of Model III are consistent in illustrating that industries with IC content generally disclose more IC than those without. In the next, section this research examines the results of the individual independent variables in order to confirm the hypothesised influence on VDIC.

6.3.1. Size

Size as measured by SALES has a positive and significant influence on VDIC. Model III confirms that large companies provide more VDIC than smaller companies. Model III is consistent with Model I and Model II in the partial correlation matrix, the Pearson correlation matrix and the QREG model. The results indicate that SALES is a key determinant of VDIC, regardless of which industry classification is applied, however the consistency in the direction and differentiation of the industry proxies provides the underlying characteristics; non-manufacturing, high technology, complexity and high technology service industries are characteristics that in the presence of high turnover result in IC disclosure. The motivation is derived from signalling the “hidden value” that drives this large market due to the lack of visibility of the underlying IC; signalling reduces asymmetric information by providing information on RC, responsible for a large market share. The variable MVTA, representing “hidden value” is significant and supportive of the above motivation.

Size in any country, appears to be an important explanatory variable whether measured by TA, SALES (Firth 1979), or MV (Hossain *et al.* 1994 and Lang and Lundholm 1993). In the Firth (1979), Cooke (1989), Wallace *et al.* (1994), Depoers (2000) and Naser *et al.* (2002) study, the SALES figure, as the measure of size, is significant with a positive coefficient. The result confirms that both tangible and intangible assets contribute to the generation of turnover, SALES is therefore included as a measure of size irrespective of the IC intensity of the company. Within IC studies, size has been confirmed as positively associated with disclosure by Bozzolan *et al.* (2003), Garcia-Meca *et al.* (2005), Garcia-Meca and Martinez (2005) and Guthrie *et al.* (2006). Model III confirms that for larger companies, the benefits of signalling IC outweigh the potential disclosure costs. Being larger and having access to more resources, larger companies may be able to institute barriers to imitation.

Management behaviour is explained by signalling theory as successful management practices are advertised to inform markets of the company's competitive advantage. Consistent with the disclosure of RC attributes that signal the IC embedded in the processes that expand markets, build and maintain customer relations and ensure adequate distribution channels. Therefore, this research confirms that SALES is a significant positive variable on the extent of VDIC, hypothesis H1.1: in Model III is accepted.

H1.1: Size as measured by SALES is a positive significant explanatory variable of the variation in the extent of VDIC.

6.3.2. TechMARK Listing

Companies that have been admitted as members of the TMRK listing are associated with higher levels of IC disclosure relative to non-members. Previous industry studies by Bozzolan *et al.* (2003), Williams (2001) and Cooke (1989, 1991 and 1992) yielded significant results. The results of the association are consistent in the partial and Pearson correlation matrices and in the OLS and QREG models. The general trend has been that innovative technology companies disclose more than non-innovative and non-technological companies do as they signal superior IC potential.

The theoretical motivation is derived from the RBV and signalling theory. Management of these companies signal investment in IA, indicative of procedures to accumulate competitive advantage by disclosing ICCA. Membership of the TechMARK listing is a reputable characteristic. The process of listing on this exchange may be complex, IC investment is not always successful, furthermore, not all IC is identifiable or measurable as such providing evidence of its existence may be problematic for several companies as only 16% (Table 6.1) of the population are listed on the exchange. Nevertheless, the results indicate that those companies that have successfully listed on this exchange are aware of the growth opportunities embedded in investment in R&D, IP and HC. The “hidden value” that is found to be larger in high technologically innovative companies is signalled to the markets to bridge the value gap.

The results confirm that management of these companies have formally prepared and processed information required for listing status and may have the know-how for processing IC information for disclosure in the financial statements. Furthermore, the complexity of achieving TechMARK listing status provides a competitive advantage that is formally acknowledged through third party accreditation. TMRK is positively associated with the extent of VDIC in Model III. The conclusion for this variable therefore is that hypothesis H3.1: is accepted.

H3.1: TMRK is a positive significant explanatory variable of the variation in the extent of VDIC.

6.3.3. Manufacturing (MANUF)

Model III indicates that companies that are classified into manufacturing, high value tangible assets and low profile industries are associated with no VDIC, whereas non-manufacturing, high value IA, service, high-tec and high profile industries are associated with VDIC. These non-manufacturing companies signal the “hidden value” not disclosed within the traditional reporting framework. The expectation that MANUF negatively affects VDIC is supported by the confirmation of MANUF consisting of mainly tangible assets. As such,

non-manufacturing companies are not embedded with as much tangible assets as manufacturing companies. Non-manufacturing companies provide more IC disclosure in a bid to disclose the existence of “hidden value” undisclosed on the balance sheet in contrast to tangible assets that are disclosed.

MANUF differentiates companies on their resource base; the existence of a greater proportion of tangible assets in product and service delivery is characteristic of these low profile manufacturing companies. Non-manufacturing companies may be associated with a lower proportion of tangible assets in their resource base. These companies may manage complex operations and hold more IC resources, expertise and know-how than the IC associated with manufacturing companies. Table 6.1 confirms a negative significant correlation between MVTA and MANUF that suggests “hidden value” is found in non-manufacturing companies.

The partial and Pearson correlation matrices provide consistent results with the OLS and QREG models. Although Camfferman and Cooke (2002), Cooke (1991) and Ho Wong (2001) report a significant positive association between disclosure and MANUF, disclosure attributes and country of study differed. Furthermore, the underlying relationship between the dependent variable and the industry membership classification would determine the expected outcome. Model III confirms the approach adopted by this research that manufacturing companies are less likely to have higher levels of VDIC as non-manufacturing companies that are expected to utilise more IC than tangible assets in their operations.

The motivations derived from signalling theory are confirmed by the existence of unique and non-replicable IA that may lead to high barriers to imitation consistent with rare, durable, imperfectly inimitable and non-tradable IC resources (Barney 1991 and Dierickx and Cool 1989). Model III thus confirms that non-manufacturing companies signal IC consistent with the existence of high levels of “hidden value”. The conclusion for this variable therefore is that hypothesis H3.2: is accepted.

H3.2: MANUF is a negative significant explanatory variable of the variation in the extent of VDIC.

6.3.4. Industry Grouping (INDG)

Model III confirms the predicted sign and that INDG is significant in the partial and Pearson correlation matrices. The QREG model provides a positive association but only at 10%. This research concludes that based on the OLS model, the multivariate analysis of Model III indicates that as the nature of operations increases from basic to more complex, so too does the level of VDIC. Non-cyclical services, utilities and information technology (IT) are classified as the more complex industries that are characterised by the “hidden value” which when coupled with the financial and human resources of larger companies, leads to more ICCA disclosure. The understanding is that basic and resource industries disclose less IC due to the lack of complexity in their operations. In contrast to basic and resource industries, complex IT and utility industries provide more VDIC as they may employ more IA in their operations. Cooke (1992) suggests that companies follow a herding behaviour in response to market demands for comparative information, as investors need to assess a company’s relative position in an industry. Nevertheless, the results from the literature have been mixed. Ng and Koh (1993) found no significant relationship between voluntary disclosure and the complexity of operations. Similarly, McNally *et al.* (1982), Wallace *et al.* (1994), Raffournier (1995), Inchausti (1997), Patton and Zelenka (1997), Owusu-Ansah (1998) found no significant association with industry, whereas Ng and Koh (1993), Gray *et al.* (1995) and Haniffa and Cooke (2002) found a significant negative relationship. The results indicate that those companies that employ IC also disclose IC. These industries follow a more proactive role in VDIC as investment in RC maintains and expands market share; these companies may be leaders in the new era of IC narrative disclosure and in the reporting of competitive advantage. Other companies may follow these new reporting trends and may begin to signal the “hidden value” created by investment in IC. This hypothesis has been confirmed by Model III, hypothesis H3:3 is accepted.

H3.3: INDG is a positive significant explanatory variable of the variation in the extent of VDIC.

6.3.5. SIC

Model III indicate that SIC is statistically significant at the 5% level with WDI in the partial correlation, the Pearson correlation, the OLS model and the QREG model. The most basic industries disclose little ICCA whereas the more complex service industries disclose more ICCA. SIC has indicated that it is positively associated with the extent of VDIC, in Model II and III in both parametric and non-parametric tests. Therefore, hypothesis H3.4: in Model III is accepted.

H3.4: SIC is a positive significant explanatory variable of the variation in the extent of VDIC.

6.3.6. MVTA

Consistent with Edvinsson and Malone (1997) who define the difference between a company's BV and MV as the value of IC this research acknowledges the existence of this "hidden value" due to the inability of traditional financial statements to report SC, RC and HC. Furthermore, in response to the measurement problems associated with the denominator in the MVBV ratio, the alternative proxy for the "hidden value" MVTA is associated with VDIC. 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. Management may be expected to provide VDIC to bridge the gap created by this difference particularly for IC intensive companies in which the MVTA ratio is larger.

Few studies have conducted a direct empirical investigation on MVTA and disclosure. Patton and Zelenka (1997) found no significant relationship between mandatory disclosure and percentage of IA. The motivations for an expectation of a positive association are derived from Garcia-Meca *et al.* (2005) that confirm MVBV as a positive significant variable in the voluntary disclosure of presentations to analysts. 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. Therefore, hypothesis H5.4: in Model III is accepted.

H5.4: MVTA is a positive significant explanatory variable of the variation in the extent of VDIC.

6.3.7. GEAR

Model III indicates 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. Model III confirms that these companies do not disclose ICCA; however, Model III is not significant in either the partial or the Pearson correlation matrices although the direction of the relationship is consistent with the predicted sign. Nevertheless, based on the results of the OLS and the QREG models, the financial risk associated with lower debt levels motivates management to increase VDIC. The explanations are derived from arguments based on agency theory; management reduce VDIC to facilitate project turnaround tactics that may sustain their positions and /or sustain the perception of success. Tangible asset based companies may have the security for debt finance, unlike IC intensive companies that may have to rely on internal generated capital or equity finance thus rendering their gearing ratios to lower levels. Thus, an increase in the gearing ratio (GEAR) increases the probability of financial and insolvency risk. As such, highly geared companies may not have the financial resources required firstly for investment in IC; secondly, highly geared companies may not have the necessary resources for 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 the cash flow available to management. Companies investing in tangible assets are more likely to have debt security whereas IC intensive companies may be associated with fewer tangible assets and therefore less debt. Furthermore, research evidence has shown that the R&D of a company is negatively associated to debt levels (Balakrishnan and Fox 1993 and Baysinger and Hoskisson 1989). This evidence is consistent with R&D as the driver of IA growth without which there is likely to be reduced levels of VDIC. 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. This research concludes that in Model III, hypothesis H4.4: is accepted.

H4.4: Highly geared companies are more likely to provide less VDIC than less geared companies are.

6.4.0. Conclusion

The objective of the empirical tests is to establish a relationship between VDIC and industry membership. The chapter confirms that the existence of a common basis of the different levels of IC between manufacturing and non-manufacturing companies; increasing levels of IC with ascending SIC code, high levels of IC required for membership of a TMRK and increasing complexity from basic to service goods in INDG provides significant results in the association with VDIC. The sensitivity test indicates a similar hierarchy of association with pharmaceutical companies disclosing the most IC content and basic resource industries the least. Overall, SALES, TMRK, MANUF, INDG, SIC, MVTA and GEAR are significant in explaining the variation in VDIC. The results indicate that companies associated with high technologically innovative characteristics whether classified under TMRK, MANUF or SIC and to a lesser extent INDG provide higher levels of VDIC; these companies include those from pharmaceutical, computer, services and electrical industries. Disclosure of ICCA attributes appears to be motivated by the presence of “hidden value” as measured by MVTA. Furthermore, consistent with the

characteristics of larger companies, the availability of resources to manage the IC disclosure process, coupled with reduced financial risk, is sufficient explanation for the signalling of IC attributes. Disclosure costs are perceived as minimal; generally, IP protection, barriers to imitation including financial, intellectual and political pressure afford the company defence from competitive losses. This research concludes that the level of IC content within industries is significant in influencing the VDIC trends. The variation in disclosure levels based on industry and sector differences has implications for standard setters in particular from an international perspective in establishing a universal IC framework. The more influential companies, particularly those with higher turnover and less dependence on debt, may be leaders in their respective economic activities; this research indicates that these companies provide more IC disclosures, given that these companies are characterised by high levels of “hidden value”. Industry norms and competitive pressures may lead to herding effects as less resourceful companies follow the reporting trends set by more proactive companies.

Some industries are regulated due to the environmental, political or financial nature of their operations. The traditional financial statements of these industries have been adjusted, amended and annexed to ensure disclosure of information that may reduce the risk attached to their sensitive operations. Financial, insurance, banking, mining and oil and gas industries show such characteristics. As is applied to the case of companies associated with higher levels of risk, standard setters encouraging more disclosure of risk information may be expected to support the argument for more IC disclosure with respect to companies associated with higher levels of “hidden value”. Such regulation may mandate specific industries to follow specific reporting practices, practices developed, implemented and upheld by the regulator in order to provide appropriate value relevant information.

7. Corporate Governance Mechanisms

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7.1.0. Introduction

In this section, the results of the regression analysis of Model IV are presented. The objective of the empirical tests is to establish a relationship between VDIC and corporate governance mechanisms. Chapter 2 outlines the development of the corporate governance hypotheses.

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 CNED + \beta_3 DIRSHS + \beta_4 EXCREM + \beta_5 TMRK + \varepsilon \quad (7)$$

The empirical tests on these hypotheses are reported in this section. Table 2.1 introduces the corporate governance analytical framework that forms the basis for assessing and developing testable hypotheses to explain the disclosure of intangible assets. The four corporate governance variables introduced EXCREM, CNED, DIRSHS and EXPRCD. Control variables in this model include TMRK for industry and MVBV as the “hidden value”.

The alignment of director and shareholder objectives may increase as the director’s shareholding increases; such an alignment may potentially reduce agency costs. Governance mechanisms may be applied to enhance accountability and transparency. This model introduces dummy variables to control for the influence of DIRSHS on VDIC. The dummy variables are established at significant percentage shareholdings, 3%, 5%, 10%, 30%, 50% and 50%+ as illustrated in Appendix 2C.

Models I to III have established size as a significant determinant of VDIC whether measured by SALES, TA or MV, thus Model IV eliminates size from the selected variables consistent with the model construction as illustrated in section 3.2.4. As indicated in Chapters 4 to 6, non-normally distributed data is transformed by square roots and logs following Cooke (1998); transformations are applied before regression tests. The choice of approach to accounting for statistical problems associated with non-normal distributions has been discussed in Chapter 3. The next section examines the level of association of variables included in Model IV.

7.2.0. Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Descriptive statistics for the dependent and independent variables are reported in Table 7.1. The results of the univariate analysis are obtained from the partial correlation matrix that illustrates the nature, direction and significance of the bivariate relationships of WDI and the independent variables; these are reported in Table 7.1. In addition, Table 7.1 reports the results of the Pearson correlation coefficients between WDI and the independent variables and the bivariate statistical correlations between all independent variables.

The descriptive statistics indicate that on average, equity value exceeds book value threefold consistent with the expectation of the content of “hidden value”; furthermore, the minimum and maximum values of MVBV indicate significant variation between companies, this is also matched by the significant variation in the extent of VDIC as illustrated by the dependent variable WDI. The descriptive statistics for untransformed variables EXPRCD and DIRSHS are not reported in Table 7.1 nevertheless, summary statistics indicate that 40% of the board consists of experienced non-executive directors and 8% of the company’s equity is held by directors. In addition, CNED indicates that 52% of chairs are non-executive directors.

The results of the partial correlation matrix indicate that companies with “hidden value”, consistent with companies in more complex industries, that remunerate both employees and directors equally well, provide substantially more IC disclosure. These companies have separate executive roles between chair and non-executive director and are characterised by lower director shareholding. The expectation of increasing director shareholding to increase VDIC has not been realised but the result has proved significant. This research proposes that the motivation for management to align goals with those of shareholders may take place at a higher shareholding ratio than that currently held by the management of companies (8%). Dummy variables introduced as a sensitivity test on this variation are summarised in Appendix 2C. VDIC increases when the roles of chair and non-executive director are segregated. Thus, executive board chairs are associated with higher levels of VDIC. The results indicate that although the relationship with EXPRCD is weak the

Table 7.1 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Variable	Mean	SD	Min	Max	COR	A	B	C	D	E	F
A SRWDI	0.561	0.118	0.265	0.866		1					
B EXCREM	1864.480	2321.618	0.000	27942.510	0.196***	0.236***	1				
C CNED	0.522	0.500	0.000	1.000	-0.169***	-0.121**	-0.064	1			
D SREXPRED	0.595	0.226	0.000	1.622	0.073	0.081*	0.148***	0.318***	1		
E SRDIRSHS	0.189	0.214	0.000	0.927	-0.198***	-0.213***	-0.213***	-0.126***	-0.114**	1	
F TMRK	0.164	0.371	0.000	1.000	0.252***	0.217***	0.070	0.055	0.056	0.021	1

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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;

EXCREM: executive remuneration;

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

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

DIRSHS: directors' beneficial shareholding in the ordinary equity of the company measured as a square root transformation;

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

direction of the relationships is consistent with the predicted sign. Furthermore, the results of the Pearson correlation matrix are consistent with the results of the bivariate findings.

The presence of the expected bivariate relationships is encouraging as these may provide the basis for interpreting the results of the multivariate analysis. The relationship amongst the independent variables indicates that corporate governance variables EXCREM and EXPRCD are correlated at 5% signifying higher directors' remuneration may be associated with board composition, when cross directorships are present amongst NONEXEC. However, with increasing director share ownership, it appears that executive remuneration is suppressed. Similarly, CNED encourages EXPRCD whilst restricting DIRSHS. On the other hand, the association between EXPRCD and DIRSHS is negative indicating that fewer experienced NONEXEC are appointed when DIRSHS is larger, furthermore that EXPRCD control employee remuneration. These findings reveal the existence of a low level of collinearity amongst the corporate governance variables; The correlation matrix identifies the conflicts of interest that exist within the governance function. To remain independent EXPRCD are encouraged to hold little or no equity. With increasing DIRSHS, conflicts of interest are expected to increase as entrenchment policies lead to reduced disclosure. As a non-executive director, CNED may be expected to increase the experiences of NONEXEC by appointing more EXPRCD. In contrast, an increase in DIRSHS may lead to better corporate governance mechanisms with respect to the separation of dual roles in CNED. The theoretical approach is adopted from agency theory as management may divert resources for self-objectives, shareholders may respond by increasing monitoring mechanisms, corporate governance mechanisms that may result in increased disclosure.

Table 7.3 presents the results of the descriptive statistics for Model IV. The distribution of governance mechanisms across industries illustrates that high rates of executive remuneration can be found in both low and high IA resource base companies. Furthermore, there is no significant distinction between the resource base and CNED; basic and pharmaceutical industries have significantly more CNED than do electrical and retail. There appears to be closer relationship between SREXPRED and the resource base of companies.

Pharmaceutical, computer and service companies appoint more EXPRCD than do engineering, retail and basic companies. Some industries may require directors to be reputable and to hold some technical expertise whereas other industries may encourage directors to take up a share in the equity.

Table 7.2 Descriptive statistics by industry

Industry Group	SRWDI	EXCREM	CNED	SREXPRCD	SRDIRSHS	TMRK
Mean						
BASIC	0.510	2292.469	0.629	0.582	0.163	0.000
CHEM	0.488	2154.764	0.600	0.597	0.213	0.000
ENG	0.490	1526.328	0.558	0.553	0.123	0.465
ELEC	0.595	1620.832	0.380	0.581	0.220	0.340
PHAR	0.700	1629.219	0.615	0.609	0.066	0.769
RET	0.493	1694.411	0.426	0.564	0.230	0.021
COMP	0.600	1993.988	0.504	0.626	0.219	0.248
SERV	0.602	1618.296	0.569	0.600	0.148	0.121
Standard deviation						
BASIC	0.115	1787.529	0.487	0.188	0.209	0.000
CHEM	0.113	3101.887	0.500	0.235	0.224	0.000
ENG	0.101	1335.894	0.502	0.256	0.188	0.213
ELEC	0.117	2725.804	0.490	0.261	0.251	0.479
PHAR	0.076	1791.161	0.506	0.290	0.078	0.439
RET	0.096	1343.355	0.500	0.215	0.234	0.146
COMP	0.103	2895.665	0.502	0.226	0.216	0.434
SERV	0.101	1733.180	0.500	0.202	0.177	0.329

Source: Descriptive statistics on research data

The directors from pharmaceutical companies hold the lowest equity in their companies; however, this is the industry with the highest concentration of TMRK listed companies. The next section examines the empirical tests derived from the hypotheses generated in Chapter 2.

7.3.0. Multivariate Analysis

Despite the results of the correlation coefficients illustrating the absence of significant collinearity, a certain degree of association may exist given that one independent variable may be an approximate linear function of a set of

Table 7.3

Multiple Regression Results between Corporate Governance Mechanism and Other Specific Characteristics with the Extent of Voluntary Disclosure of Intellectual Capital

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 CNED + \beta_3 DIRSHS + \beta_4 TMRK + \beta_5 EXCREM + \varepsilon$$

(7)

Model	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8
Dependent variable	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI	SRWDI
Independent variables								
CONSTANT	0.549*** (29.23)	0.508*** (27.92)	0.538*** (21.11)	0.511*** (17.94)	0.566*** (44.14)	0.491*** (28.93)	0.554*** (28.770)	0.510*** (26.230)
EXCREM	0.000*** (3.20)	0.000*** (4.37)		0.000** (2.46)	0.000*** (4.84)	0.000*** (5.09)	0.000*** (2.950)	0.000*** (3.990)
CNED	-0.040*** (-3.61)	-0.059*** (-4.83)	-0.056*** (-3.17)		-0.052*** (-4.24)	-0.054*** (-4.31)	-0.038*** (-3.390)	-0.057*** (-4.440)
SREXPRCD	0.037*** (1.38)	0.102*** (3.76)	0.106*** (2.75)	0.051 (1.25)		0.093*** (3.34)	0.041 (1.490)	0.098*** (3.460)
SRDIRSHS	-0.105*** (-4.14)	-0.074*** (-2.66)	-0.115*** (-2.95)	-0.089** (-2.04)	-0.081*** (-2.82)			
TMRK	0.076*** (5.91)	0.089*** (5.73)	0.083*** (3.74)	0.084*** (3.44)	0.083*** (5.1)	0.088*** (5.54)	0.079*** (6.07)	0.091*** (5.690)
DS1							-0.033** (-2.240)	-0.018 (-1.060)
DS2							-0.028 (-1.170)	0.016 (0.610)
DS3							-0.048*** (-2.870)	-0.029 (-1.450)

DS4	-0.052***	-0.025
	(-3.100)	(-1.410)
DS5	-0.071***	-0.049*
	(-3.370)	(-1.770)
DS6	-0.062*	-0.022
	(-1.820)	(-0.660)
Mean VIF	1.090	
Z	0.17	
F ¹	16.23***	
R ² (adjusted or pseudo) ¹	0.16	0.10
N	439	439
		0.07
		439
		0.09
		439
		0.09
		439
		0.10
		439
		0.17
		439
		8.81***
		0.21
		1.15

VIF

Variance inflation factor

Z

OLS specifications reported normal residuals ($z = 0.17$) and these models (4.2 to 4.8) were re-specified using quantile regression.

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; *** $p < .01$; ** $p < .05$; * $p < .10$

SR

Variables transformed by square roots are prefixed with SR;

LN

Variables transformed by logs are prefixed with LN;

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

EXCREM: executive remuneration;

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

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

DIRSHS: directors' beneficial shareholding in the ordinary equity of the company measured as a square root transformation;

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

DS1: dichotomous variable that scores “1” for directors’ shareholding greater than zero and equal to or less than 2.9% and “0” otherwise;

DS2: dichotomous variable that scores “1” for directors’ shareholding greater than 2.9% and equal to or less than 4.8% and “0” otherwise;

DS3: dichotomous variable that scores “1” for directors’ shareholding greater than 4.8% and equal to or less than 9.6% and “0” otherwise;

DS4: dichotomous variable that scores “1” for directors’ shareholding greater than 9.6% and equal to or less than 29.2% and “0” otherwise;

DS5: dichotomous variable that scores “1” for directors’ shareholding greater than 29.2% and equal to or less than 49% and “0” otherwise;

DS6: dichotomous variable that scores “1” for directors’ shareholding greater than 49%.

several independent variables. This research therefore applies a sensitivity test as an effective test of multicollinearity: the variance inflation factor (VIF). This factor is reported in Table 7.3; collinearity does not appear to be a serious problem in Model IV as the highest factor does not exceed 10. Consistent with Models I, II and III, two tests of collinearity are applied to ensure that no one variable may be an approximate linear function of a set of several independent variables. The results of the VIF are reported in Table 7.3; collinearity does not appear to be a serious problem in Model IV, as the highest factor does not exceed 10. Table 7.3 presents Model IV, the regression of WDI and four corporate governance variables. A robust linear regression is run on the independent variables. The F – statistic 0.16 is significant at 1% and R^2 is 0.16. Overall, the model appears robust; the sample size is large (339 observations). This research formulates a one-sided test as a statistical hypothesis in which the coefficients for which we can reject the null hypothesis, $H_0 > 0$. This research formulates the null hypothesis to determine if Model IV has any explanatory power.

$$H_0: \text{all coefficients are } < \text{“0”}$$

This research rejects H_0 when $F_{observed} > F_{critical}$. Thus $F_{(.05, 5, 439)} = 1.96$. This research therefore rejects the null hypothesis that all the variables jointly have no explanatory power in the model. As $F > F_{critical}$, H_0 is rejected and this research concludes that Model IV has some explanatory power.

Model IV indicates that additional experience and cross-directorships in EXPRCD does not lead to higher levels of VDIC. Nevertheless, the QREG model indicates a positive and significant association. The sensitivity test applied to DIRSHS overall has no influence on other variables included in the model. Both the OLS and QREG model report consistent results in the presence of the dummy variables. Furthermore, EXPRCD becomes significantly stronger in its association with VDIC. With respect to DIRSHS, dummy variables indicate varying results for the respective equity percentages held by directors. The relationship is found to be insignificant with respect to directors' shareholding greater than 2.9% and equal to or less than 4.8%. With respect to the QREG model, generally results are not significant perhaps signifying the

lack of sufficient incentives for VDIC. However, the OLS model finds a significant negative association at the 2.9% level, but an insignificant association between 2.9% and 4.8%. Within the 4.8% to 9.6% equity ownership band, the band in which the average sample company falls, director ownership suppresses IC attribute disclosure consistent with the beginnings of shareholder control conflicts and entrenchment policies. Directors, who own on average 29.2% to 49% of share equity as represented by DS5, disclose the least amount of IC attributes. This level of DIRSHS may be associated with entrenchment strategies as the executive board increases control and as private benefits may not be available to minority shareholders. In all respects, however the direction of the relationship is not consistent with the predicted sign and may reveal the existence of management entrenchment policies. The individual results of variables included in Model IV are discussed in section 7.3.1 to 7.3.8. The normality of the residuals indicates normal distribution above this research-defined threshold of 5% confidence for non-normality.

7.3.1. EXCREM

Model IV confirms that EXCREM is a significant determinant of VDIC. A high EXCREM may indicate the value placed on the executives by management and the resultant VDIC may be attributed to signalling theory consistent with EMPC, employee remuneration in general. Furthermore, a high ratio may indicate reduced financial risk as debt repayments may be low and the conflict of interest reduced. The separation of ownership and control may be exacerbated by the incidence of asymmetry of information as management exploit their information advantage to the detriment of stakeholders. However, higher executive remuneration may align director and shareholder goals resulting in VDIC. Furthermore, EXCREM may be viewed as a performance variable in that companies that pay a higher wage to directors may have the incentive to make more VDIC in order to communicate good performance to investors (Raffournier 1995). The results confirm the theoretical argument based on signalling and the direction of the relationship is consistent with some prior studies. Lufti (1989) identified share option schemes as positive and significant in influencing voluntary disclosure in UK unlisted companies. This

study applied share option scheme as a proxy for remuneration and benefits that management may accrue during their employment. Agency theory was applied as the theoretical approach suggesting that EXCREM is linked to agency theory within disclosure studies. The incidence of agency costs may be reduced in the presence of higher remuneration packages that may provide the impetus for management to align their goals with those of the company. The need for management to ensure continuance in office too, particularly when remuneration is tied in to share performance may lead to VDIC, as an increase in company value may directly benefit directors. The results indicate that in the presence of “hidden value”, highly complex service industries characterised by low debt levels provide significantly more IC attribute disclosure if their employees and executives are well paid for their services. Such remuneration is expected to be above market average and therefore sufficient to, not only retain employees and directors, but to ensure adherence to prescribed company policies and procedures. Model IV indicates that the direction of the relationship is positive and significant consistent with explanations based on signalling theory. The conclusion for this variable therefore, is that hypothesis H6.2: is accepted.

H6.2: EXCREM is a negative significant explanatory variable of the variation in the extent of VDIC.

7.3.2. Non-executive Chair (CNED)

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 IV with or without dummy DIRSHS variables. Where the roles of chair and NONEXEC are separate, increased VDIC may ensue. Alignment of shareholder and management objectives by these executive chairs may lead to reduced agency costs. However, the CNED does not increase VDIC and therefore 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 IC, 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, this result is consistent with Model IV. The literature indicates mixed results for studies conducted on independent board leadership as measured by CNED and executive chair. Overall, there appears to be no significant difference in performance between executive and non-executive board chairs (Chaganti *et al.* 1985, cited by Davis *et al.* 1997; and Molz 1988, cited by Davis *et al.* 1997). Nevertheless, Dahya *et al.* (1996) concluded that the market responds favourably to the separation of the roles of chair and chief executive officer (CEO) and that accounting performance of companies adopting a “dual CEO” declined subsequent to this change. In addition, Dalton and Kesner (1987) and Worrell *et al.* (1997) argue that dual roles compromise board independence and may lead to conflicts of interest that may negatively influence shareholder value creation. According to agency theory, the combined functions of chair and NONEXEC can significantly impair the board’s most important role of monitoring, disciplining and compensating senior managers Barako *et al.* (2006). Lack of segregation of duties may provide the opportunity for opportunistic behaviour. Forker (1992) concluded combined roles in the executive signalled the absence of separation of decision management and decision control (Fama and Jensen 1983). The results and the literature suggest that the combined role of CNED is likely to require increased monitoring, the direction of the relationship is negative and significant therefore hypothesis H8.4: is accepted.

H8.4: The CNED is a negative significant explanatory variable of the variation in the extent of VDIC.

7.3.3. EXPRCD

Model IV does not confirm the hypothesis of a positive significant relationship between VDIC and EXPRCD. The multivariate analysis illustrates that the

proportion of EXPRCD is not associated with the level of VDIC. Both parametric and non-parametric results indicate a non-significant association. The QREG model however, provides better results indicating a positive association at 5% for the variation of the model without dummy DIRSHS variables and at 1% for the variation of the QREG model, which includes dummy DIRSHS variables. The non-parametric results indicate a weaker association, although these cross-directorships may be expected to assist in making information more transparent following successful implementation in other companies and in addition, in providing value relevant information for comparability with the knowledge of other organisations (Dahya *et al.* 1996). The results of Model IV are consistent with the approach of Turnbull (1997), EXPRCD may not have the intelligence or variety in information control nor the inside information to evaluate management. As such, EXPRCD may not have 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 not been realised with respect to IC.

The literature has reported varying results. In the UK, Lufti (1989) reported insignificant results on the influence of NONEXEC on voluntary disclosure; in the US Malone *et al.* (1993), reported an insignificant result between mandatory and voluntary disclosure and proportion of outside directors. Both Ho and Wong (2001) and Haniffa and Cooke (2002) applied agency theory and reported insignificant results. Studies in favour of NONEXEC' domination on boards includes Kesner and Johnson (1990) and Grace *et al.* (1995); the motivation for these hypotheses is based on agency theory and the monitoring role of EXPRCD. Support for a positive association is derived from Adams and Hossain (1998) and Chen and Jaggi (2000) who found empirical evidence of a positive relation between proportion of independent directors and mandatory disclosure. Deakin and Konzelmann (2004) however report on the complexity of the monitoring role of NONEXEC. They suggest that Enron's NONEXC were as well qualified as any group of outsiders could have been to judge the regulatory and business risk that arose

from company operations, however their failure to identify these risk places questions on corporate governance reformers insistence on independence for NONEXEC. This approach is consistent with Eng and Mak (2003) who find that outside directors reduce corporate disclosure. Eng and Mak (2003) suggest that one reason for this result is that NONEXEC may be a substitute for voluntary disclosure. Another reason put forward is that NONEXEC may not be truly independent; EXPRCD may not be truly experienced as cross-directorships within similar business cultures may only yield common knowledge.

Malone *et al.* (1993) find no evidence of the influence of NONEXEC on disclosure quality; similarly, Leung and Horwitz (2004) find no support for better disclosure attributed to NONEXEC; they suggest that the presence of high director ownership mitigates the monitoring role of NONEXEC. Consistent with the OLS model that exhibit robust results this research concludes that Model IV is not consistent with the expectations generated by the theoretical basis. UK DIRSHS at 8% may not be sufficiently large to influence the EXPRCD mandate therefore, hypothesis H8.1: is rejected.

H8.1: The proportion of EXPRCD to total directors is a positive significant explanatory variable of the variation in the extent of VDIC.

7.3.4. Directors' Shareholding (DIRSHS)

In Table 7.1, the parametric tests indicate a negative significant association at 1%. The regression analysis of Model IV suggests that the current share of equity held by management is insufficient to motivate management to have high levels of VDIC. DIRSHS has indicated that it is negatively associated with the extent of voluntary and mandatory disclosure in previous research. Jensen and Meckling (1976) and Leftwich *et al.* (1981) noted that agency costs are associated with increasing level of non-owner management in a firm. These agency costs arise from the separation of the principals (shareholders) from the decision-making function in the firm.

As agency theorists propose that the level of VDIC is a function of the relationship between the principles and the agents, voluntary disclosure is a

monitoring mechanism principals employ to cost efficiently scrutinise the activities of the agent to ensure their residual claims are not diluted (Jensen and Meckling 1976). On the other hand, the relationship between managerial share ownership and voluntary disclosure is expected to be negative because the conflict between shareholders and management increases as managers' share ownership decreases (Jensen and Meckling 1976, Watts 1977, Chow 1982 and Dhaliwal *et al.* 1982). Model IV is consistent with this approach. The literature has revealed similar results with Eng and Mak (2003) reporting a negative result between managerial ownership and voluntary disclosure.

The results of the dummy variables indicate that irrespective of the percentage equity held, directors that hold company shares do not favour VDIC. Although, the relationship is negative in all cases, the level of significance varies with varying equity held by directors. Between 30% and 50%, results are significant; management employ entrenchment policies that utilise information asymmetry and reduced VDIC as mechanisms for postponing managerial replacement. Agency theory explains manager behaviour commensurate with self-serving. In Model IV, DIRSHS is significant in explaining the variation in the extent of VDIC however, with reference to IC and to its proprietary costs, it may be expected that as managers take on more equity, they become more risk averse particularly with respect to competitive losses. It appears that at this level of DIRSHS, equity held is not sufficient to motivate management behaviour into matching that of shareholders.

With reference to Leung and Horwitz (2004) who found that voluntary segment disclosure increases as director ownership rises from 1% to 25%, supporting the approach that alignment of director and shareholder goals leads to more disclosure. Nevertheless, further increases resulted in lower disclosure due to the shift from agency to minority interest conflicts with shareholders. Agency theory explains management behaviour commensurate with self-serving interests below a threshold level of beneficial ownership. Management and shareholder aims are not aligned. Nevertheless, the results of this research indicate that increasing corporate governance mechanism by increasing directors' beneficial ownership does not lead to increased VDIC. The results may differ from those of Leung and Horwitz (2004) due to DIRSHS in Hong Kong being on average 38.6% and in the UK on average 8%. Furthermore,

proprietary costs attributed to segmental disclosure may be perceived to be less in Leung and Horwitz (2004) or that the signalling benefits of IC are more in this research, the nature of the attributes disclosed may be influential. Model IV indicates that such ownership in share options and management shareholdings has not achieved the desired objective of aligning shareholder and management goals. Above the threshold equilibrium point, issues with respect to concentrated ownership come into the fore.

Management share ownership is a direct signal to the market of management's confidence to invest in the company. Nevertheless, as directors become large shareholders, ownership concentration increases. Hossain *et al.* (1994) find support for low extent of voluntary disclosure with increasing ownership concentration. Shleifer and Vishny (1997) suggest that increasing ownership is associated with increasing control, large shareholders may be able to generate private benefits of control that are not shared by minority shareholders. As such, costs associated with the existence of high ownership and entrenchment policies may be influential in this disclosure decision. Controlling shareholders have an incentive to avoid disclosing detailed IC information that may attract close monitoring by minority shareholders and mitigate their private benefits as executive board ownership increases (Leung and Horwitz 2004). At the extreme end of this scale, Fama and Jensen (1983) contend that companies controlled by management are less likely to survive in competition consistent with the findings of Demsetz and Lehn (1985) that illustrate a significant association between DIRSHS and firm performance. Nevertheless, Stultz (1988) proposes that the likelihood of successful takeovers is reduced as management ownership increases, due to the high premium demanded by management who hold substantial shares.

Consistent with the results of the dummy variables in Model IV, excessive management ownership exceeding 50% may be counter-productive to companies' long-term value. This contention is found in the entrenchment theory (Fan and Wong 2002) that predicts higher management interests lead to lower voluntary disclosure. Shleifer and Vishny (1997), Leung and Horwitz (2004) and Fan and Wong (2002) suggest that the controlling owner effectively decides on the accounting policies which result in lower voluntary disclosure at the detriment of minority shareholders. It may be that the management

entrenchment hypothesis could explain the negative association and its effects could mitigate the effects of agency costs. This approach is consistent with the negative association as illustrated in Table 7.1 and 7.3. Model IV indicates a significant negative association with VDIC and therefore hypothesis H8.6: is rejected.

H8.6: DIRSHS is a positive significant variable in the variation of the extent of VDIC.

7.3.5. TechMARK Listing

Companies that have been admitted as members of the TMRK listing are associated with higher levels of IC disclosure relative to non-members. The results of the association are consistent in the partial and Pearson correlation matrices and in the OLS and QREG models. TechMARK listing status provides a competitive advantage that is formally acknowledged through third party accreditation. TMRK is positively associated with the extent of VDIC in Model IV. The conclusion for this variable therefore is that hypothesis H3.1: is accepted.

H3.1: TMRK is a positive significant explanatory variable of the variation in the extent of VDIC.

7.4.0. Conclusion

Corporate governance mechanisms address the agency problem and the separation of ownership and control. The extent to which management disclose IC is influenced by the composition and quality of the board of directors. The corporate governance variables included in Model IV have returned mixed results on their influence on VDIC. The theoretical approach is adopted from agency theory as management may divert resources for self-objectives, shareholders may respond by increasing monitoring mechanisms, corporate governance mechanisms that may result in increased disclosure.

There are important connections between VDIC and corporate governance mechanisms. Both concepts focus on value creation for shareholders; IC leverages a company's IA and corporate governance focuses on stakeholder influences that affect managerial decision-making (Weimer and Pape 1999). As such, corporate governance is accountable for its traditional role with respect to financial and physical capital and in addition for IC. Furthermore, corporate governance mechanisms are themselves IC, being mobilisations of human, culture, innovation, external and internal structure capital geared towards achieving company objectives (Keenan and Aggestam 2001). As such, Model IV confirms that shareholders apply corporate governance mechanisms to increase monitoring; these mechanisms assure shareholders of a return on their investment. Investors cannot rely on financing without corporate governance mechanisms. Further, legal protection of investor rights is one essential element of corporate governance mechanisms.

The system of corporate governance in the UK is dependent on political, social and economic factors. These factors may not reflect efficiency considerations focused on managing agency problems. As a mechanism that evolved over time, the legal framework may be more associated with class struggles over the rights and roles of shareholders and employees rather than with laws and institutions specifically set out to control agency costs. Fligstein and Choo (2005) summarise the empirical literature by concluding that the relative advantage of a particular system of corporate governance and its governing legal framework, is difficult to pinpoint, even so once discerned, no conclusions can be reached as to its dominance over other systems. In as much as components of national corporate governance systems work together as a system, features such as intellectual property law, financial market regulation and labour laws, these same features compliment the existence and review of corporate governance mechanisms.

Within the UK, regulation of IC mandatory disclosure is low. However, national systems are effective in motivating VDIC; this self-regulation is in part possible through IP rights, copyrights, brands and trademarks that are protected within property law; possible through financial markets that are liquid in which management replacement is possible and labour laws that protect employee rights. Within the context of this environment, the expectation that corporate

governance mechanisms facilitates VDIC has been realised given the overall positive effect of IC attribute disclosure on title and ownership of SC, liquidity of financial markets (RC) and maintenance of HC through employee remuneration. In contrast, the critical perspective regards corporate governance mechanisms as setting standards that protect the existing status quo. Pesqueux (2005) describes these standards as arising from a social game that permits dominant interests to impose their positions and that corporate governance mechanisms strengthen and legitimise these standards.

Consistent with this critique, IC disclosure may be one such standard, not being embedded in law, VDIC may serve the purpose of protecting an exclusive set of companies involved in highly innovative technological development. Weak corporate governance and lack of transparency are often associated with financial crisis and financial scandals when the dominant interests suffer loss. The conclusion of this research, that corporate governance mechanisms aid VDIC, is consistent within the wider context. Support from the legal structure and financial market renders corporate governance mechanisms tools through which shareholders can impose, control and monitor their interests. VDIC represents such a monitoring tool as additional disclosure reduces agency costs between management and shareholders in addition to creating value with respect to disclosure of the “hidden value”.

Furthermore, the separation of executive roles through segregation of duties reduces the power held by one individual. The separation of directors into executive and non-executive maintains the independence of the monitors and reduces agency costs. Consistent with the existence of “hidden value” companies providing better financial benefits for their employees both executives and non-executives are able to retain HC; corporate governance mechanisms advocate transparency and accountability, VDIC provides the signalling mechanisms that convey this HC to the markets. The next chapter reports on Model V, the Full Model in which the effects of investment in IC, accounting risk measures, industry membership and corporate governance mechanisms are investigated individually and in aggregate.

8. Full Model

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8.1.0. Introduction

The objectives of the empirical tests are to establish a relationship between VDIC and various IC, risk, industry and corporate governance variables and to ascertain the effect of DI and WDI on Model V.

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR + \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIC + \beta_7 TMRK + \beta_8 SIZE + \varepsilon \quad (8)$$

The eight variables introduced are EXPRCD, GEAR, CNED, EMPC, MVTA, SIC, TMRK and SIZE. In this model, the size variable is represented by SALES although Models I to III indicate that TA or MV may be suitable size proxies. SALES is selected due to the inclusion of MVTA ratio as the variable that is a measure of “hidden value” and this research approach not to include two collinear variables in the same model. Thus, the two measures of IC investment introduced examine HC content in the case of EMPC and “hidden value” in the case of MVTA.

Industry has been identified as a control variable that enhances the results of regressions by controlling for sector differences. The classification of SIC differentiates companies along the lines of IC content and complexity; in the case of TMRK, the classification is based on companies that are technologically innovative, R&D and IA intensive and those that are not. GEAR is introduced as the proxy for financial risk. The focus on risk is based on the requirement for financial and liquidity stability sufficient to permit the investment in IC to take place. In addition, as illustrated in Table 8.1 inconsistent results for GEAR in the general literature leads to added interest in its association with VDIC. Furthermore, although R&D and IA growth have been predicted to increase performance, no research has investigated the influence of risk within IC studies and only a few have investigated GEAR. The corporate governance mechanisms CNED and EXPRCD represent the HC and expertise that manages the company. In addition, these variables examine corporate governance mechanisms related to dominant personalities, the influence of external advice attributed to cross-directorships, segregation of executive roles, separation of executive and non-executive functions and

Table 8.1 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients (WDI)

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

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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.

monitoring role of NONEXEC. CNED is influential in disclosure decisions; in addition, expert advice on current practice as a NONEXEC may be invaluable in the alignment of management and shareholder objectives. The construction of the model achieves the objectives of identifying the combined and individual effects of the different focus areas within IC research. This chapter is divided into three sections; the first, presents the results of the descriptive statistics, the partial and Pearson correlation matrices and the second presents the results of the multivariate regression analysis.

8.2.0. Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients

Tables 8.1 and 8.2 illustrate the nature, direction and significance of the bivariate relationships of WDI and DI and the independent variables, the results of the descriptive statistics and the results of the Pearson correlation coefficients between WDI and DI and the independent variables. The results of the descriptive statistics on the disclosure indices indicate that there is a wide range of variation in the extent of VDIC indicating a wide range of IC disclosure practices.

WDI measures both the construct of existence of an IC attribute (DI) and the construct of competitive advantage (WDI) as such this research applies WDI as the dependent variable for Models I to IV. In the Full Model however, DI is applied as the dependent variable, in addition to WDI as a sensitivity test. The results of the descriptive statistics for WDI and DI indicate that at the IC attribute and IC category analysis in Table 4.1, management discloses more RC than either SC or HC; although, at the individual attribute level the top three IC attributes are disclosed from HC category. The results of the descriptive analysis of DI and WDI are presented in Tables 8.1 and 8.2 that 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 close and the standard deviation is marginal indicating that the content analysis methodology was appropriate and reliable in measuring disclosure quality in ICCA; 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

Table 8.2 Descriptive Statistics, Univariate Analysis and Pearson Correlation Coefficients (DI)

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

Source: Descriptive statistics on research data

The table reports the results of the descriptive statistics, the univariate analysis (COR) and the Pearson 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: $\frac{\text{total debt} / \text{total capital \% (long term debt + short term debt \& current portion of long term debt)}}{(\text{total capital} + \text{short term debt \& current portion of long term debt}) * 100}$;

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.

disclosed. This variance indicates that fewer disclosures are competitive advantage related.

The descriptive statistics indicate that data in Tables 8.1 and 8.2 are not normally distributed. The literature has indicated that data from disclosure studies is seldom strictly normally distributed (skewness = 0). This research defines normal distributions when the skewness ≤ 2 and kurtosis ≤ 3 . Further, as summarised by Cooke (1998), normal distributions are not often found in disclosure studies, this research is no exception, the descriptive statistics indicate that some variables are more skewed than others are, as such transformations are applied before regression tests. Data and statistical analysis indicates that of the continuous variables, SALES and EXPRCD require transformation to achieve research-defined normality. Dichotomous variables indicate that 16% of the sample companies are members of the TechMARK listing and that 52% of chairs are non-executive directors. MVTA is significant as a representative of “hidden value” as is MVBV; companies strive to increase shareholder value. The ratio of MVTA is a little over 1 at 1.16, it indicates that TA is as representative a proxy for size as is MV. Furthermore, the mean value for MVTA indicates that on average the sample MV exceeds TA by 16%. However, the minimum and maximum values for MVTA indicate that the “hidden value” varies from a fraction of the TA value to over ten times the value of TA. The standard deviations in the distribution of EMPC, illustrates the variance in distribution of employee remuneration across sectors and therefore potentially, the variability attached to the value of HC in these sectors.

The partial correlation (COR) results illustrate that consistent with the predicted sign, variables SALES, MVTA, TMRK, SIC, EMPC and CNED are associated with ICCA attributes. Generally, the results of DI and WDI are consistent with GEAR being the only variable not associated with VDIC in both WDI and DI variations. The partial correlation matrix indicates that large companies signal their competitive advantage through disclosure; the “hidden value” as represented by MVTA leads to the disclosure of IC that may otherwise remain invisible to shareholders and investors. As a representative of the investment in IC, EMPC is associated with VDIC as companies signal the value of HC in generating competitive advantage. Models II, III and IV indicate that GEAR is not a significant component of firm-specific risk within the

univariate analysis; nevertheless, its inclusion is significant within the multivariate analysis suggesting that it is an important control variable. The existence of “hidden value” accompanied by large sales revenue is sufficient motivation for companies in high technology and innovative industries to disclose IC. It may be that these companies do not rely on debt to finance their operations due to the lack of adequate debt security and the specificity and non-tradability of their assets.

Consistent with Table 4.4, 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 technologically innovative and R&D intensive companies. Similarly, SIC differentiates companies on a basis of technology content and complexity. The variable CNED indicates that VDIC decreases when the roles of chair and NONEXEC are combined. The expectation that, additional experience and knowledge that may accrue from being a NONEXEC may result in a motivation to increase VDIC has not been realised. 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. Overall, the results indicate that companies with “hidden value” attributed to the existence of an IA resource base, consistent with companies in more complex industries, that remunerate employees well provide substantially more IC disclosure. 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. This result provides further evidence of the quality of WDI as a measure of both constructs of existence of IC and competitive advantage in ICCA. The results of inter-collinearity between the independent variables, indicates that the larger companies are associated with lower levels of “hidden value”. Furthermore, it is the smaller companies that are associated with industries involved in technologically innovative operations as well as more complex service orientated activities. The association between size and CNED

Table 8.3 Descriptive statistics by industry

Industry Group	SRWDI	SRDI	LNSALES	MVTA	GEAR	TMRK	SRSIC	EMPC	SREXPRCD	CNED
Mean										
BASIC	0.510	0.668	6.481	0.861	0.345	0.000	54.061	35.092	0.582	0.629
CHEM	0.488	0.640	5.936	1.224	0.323	0.000	56.590	22.906	0.597	0.600
ENG	0.490	0.640	6.529	0.726	0.384	0.465	54.826	33.191	0.553	0.558
ELEC	0.595	0.726	5.778	1.013	0.336	0.340	59.414	41.077	0.581	0.380
PHAR	0.700	0.778	5.126	2.865	0.232	0.769	49.406	531.435	0.609	0.615
RET	0.493	0.633	6.043	1.268	0.295	0.021	72.348	20.970	0.564	0.426
COMP	0.600	0.694	5.231	1.291	0.329	0.248	85.898	36.258	0.626	0.504
SERV	0.602	0.707	5.915	1.141	4.871	0.121	89.436	33.247	0.600	0.569
Standard deviation										
BASIC	0.115	0.126	1.749	0.416	0.241	0.000	15.310	31.421	0.188	0.487
CHEM	0.113	0.114	1.930	1.186	0.222	0.000	10.922	13.676	0.235	0.500
ENG	0.101	0.097	1.979	0.526	0.186	0.213	3.366	59.050	0.256	0.502
ELEC	0.117	0.103	2.447	1.012	0.296	0.479	5.739	51.301	0.261	0.490
PHAR	0.076	0.085	3.032	2.601	0.234	0.439	0.000	1740.654	0.290	0.506
RET	0.096	0.101	1.934	1.316	0.253	0.146	1.084	12.976	0.215	0.500
COMP	0.103	0.096	1.855	1.189	0.747	0.434	0.492	15.842	0.226	0.502
SERV	0.101	0.096	1.729	1.256	34.026	0.329	7.328	73.109	0.202	0.500

Source: Descriptive statistics on research data

reveals that larger companies generally separate the executive roles of chair and NONEXEC. This choice may be due to the availability of more resources in larger companies. Companies that are associated with greater numbers of EXPRCD are associated with less remuneration for employees that may be attributed to their monitoring and control function. However, EXPRCD may be seen to encourage the appointments of chairs who are NONEXEC consistent with their own roles as NONEXEC. TMRK listed companies are confirmed as having higher levels of “hidden value”. Overall, the results of Model V are consistent with both WDI and DI and in the partial and Pearson correlation matrices. The major finding however is that WDI is more responsive than DI, as a quality disclosure index WDI is able to capture the “hidden value” as in MVTA, the industry reporting trends in SIC and number of NONEXEC as in EXPRCD. Overall, the Pearson correlation matrix illustrates that there is no significant correlation between WDI or DI and any of the independent variables. The correlations are therefore not sufficiently significant to influence the effect of one variable by another due to association.

Table 8.3 presents the descriptive statistics by industry for Model VI. Both DI and WDI indicate that pharmaceutical companies disclose higher levels of IC and ICCA attributes; two theoretical approaches are considered in this research to investigate this relationship, the RBV and signalling theory. In the case of WDI, chemical companies disclose the least ICCA attributes; this research has considered that such low disclosure may be due to proprietary costs. In the case of DI, retailers have the lowest level of IC disclosures; a low IA resource base is considered as the underlying reason for lack of IC disclosure for this industry. Nevertheless, the lack of an IA resource base is no limiting factor in respect of turnover, basic and engineering companies that have the lowest MVTA ratio, have the highest levels of sales. These industries have companies that have less IA resources than they do tangible assets. In contrast, pharmaceutical and computer industries have comparatively lower levels of turnover relative to basic and engineering industries; however, they hold the largest “hidden value” that may be attributed to a largely intangible assets resource base. The financial risk attributed to engineering and basic industries is significantly more than that associated with pharmaceutical companies and retailers. Service industries consisting of transport, health and

leisure and hotels, have significantly more debt finance than any other industries. Companies in these industries invest in tangible resources and may thus require debt finance, as is the case with engineering and basic industries. Industry variables provide consistent results basic, chemical and retail industries that have less IA resources, are not members of the TechMARK listing. The highest concentration of these members is found in the pharmaceutical and engineering industries. Service and computer companies are considered the most complex industries. Nevertheless, employee remuneration in pharmaceutical companies is more than in other industries. The retailer industry provides the lowest remuneration to employees; companies in this industry have the lowest ratio of EXPRCD, however their chairs are generally executive directors. In contrast, pharmaceutical companies have a high ratio of EXPRCD and a high ratio of CNED. The differences may be attributed to the industry resource base that is predominantly intangible in the case of pharmaceutical companies and largely tangible in the case of retailers. The next section discusses the results of the multivariate analysis.

8.3.0. Multivariate Analysis

The next section examines the results of the regression equation of Model V. Comparative regression equations are presented, the first with DI as the dependent variable in place of WDI and the second is the QREG model that investigates the sensitivity of WDI to assumptions of non-continuity. Model V includes a further sensitivity test that replaces the selected industry membership variables with dummy industry variables in all variations of Model V including the OLS and QREG models and variants that include WDI and DI separately. Consistent with the approach adopted by this research in accounting for non-normality, the dependent variable WDI is transformed by square root, MV is transformed into logs, SIC codes are transformed into square roots and EXPRCD is transformed into square roots.

Thus in Model V, the dependent variable is represented by WDI the ratio of ICCA attributes disclosed to the total potential ICCA disclosures. EXPRCD represents the ratio of experienced non-executive directors to the total number of directors; it is obtained from the annual report. This experience

Table 8.4 OLS AND QREG Regression - Model V: The Full Model SRDI and SRWDI

$$WDI = \beta_0 + \beta_1 EXPRCD - \beta_2 GEAR - \beta_3 CNED + \beta_4 EMPC + \beta_5 MVTA + \beta_6 SIC + \beta_7 TMRK + \beta_8 SIZE + \varepsilon \quad (8)$$

Model	5.1	5.2	5.3	5.4	5.5	5.6	5.7	5.8
Dependent variable	SRWDI	SRWDI	SRDI	SRDI	SRWDI	SRWDI	SRDI	SRDI
Independent variables								
CONSTANT	0.258*** (8.160)	0.263*** (7.180)	0.446*** (14.940)	0.460*** (11.590)	0.314*** (11.340)	0.283*** (9.370)	0.464*** (18.630)	0.460*** (13.760)
LNSALES	0.025*** (9.240)	0.023*** (7.700)	0.026*** (10.390)	0.026*** (7.860)	0.024*** (10.230)	0.024*** (9.340)	0.025*** (10.750)	0.025*** (8.500)
MVTA	0.016*** (3.710)	0.020*** (4.220)	0.011*** (2.870)	0.012** (2.240)	0.015*** (3.720)	0.012** (2.600)	0.011*** (2.980)	0.014*** (2.830)
GEAR	-0.000*** (-10.030)	-0.000*** (-8.400)	-0.000*** (-9.290)	-0.000*** (-6.860)	-0.001*** (-10.680)	-0.001*** (-9.080)	-0.000*** (-9.120)	-0.000*** (-6.350)
TMRK	0.092*** (6.580)	0.098*** (6.160)	0.073*** (5.830)	0.075*** (4.330)				
SRSIC	0.001*** (4.900)	0.001*** (3.740)	0.001** (2.260)	0.000				
EMPC	0.000*** (10.800)	0.000*** (12.890)	0.000*** (12.040)	0.000*** (9.690)	0.000*** (3.970)	0.000*** (3.440)	0.000*** (5.410)	0.000*** (4.010)
EXPRCD	0.053** (2.110)	0.091*** (3.540)	0.053** (2.580)	0.065** (2.320)	0.037 (1.640)	0.045* (1.970)	0.044** (2.250)	0.071*** (2.720)
CNED	-0.026** (-2.540)	-0.046*** (-3.890)	-0.027*** (-2.810)	-0.045*** (-3.500)	-0.018* (-1.880)	-0.025** (-2.300)	-0.022** (-2.270)	-0.035*** (-2.990)
BASIC					0.015 (0.700)	0.049** (1.990)	0.019 (0.900)	0.029 (1.070)

ENG	-0.004 (-0.200)	0.025 (0.960)	-0.009 (-0.430)	-0.011 (-0.400)
ELEC	0.111*** (4.670)	0.146*** (5.740)	0.088*** (4.070)	0.096*** (3.420)
PHAR	0.197*** (8.430)	0.224*** (6.100)	0.126*** (5.230)	0.111*** (2.740)
RET	0.001 (0.030)	0.014 (0.530)	-0.013 (-0.570)	-0.035 (-1.230)
COMP	0.125*** (6.540)	0.152*** (6.700)	0.067*** (3.620)	0.055*** (2.210)
SERV	0.117*** (5.630)	0.142*** (5.760)	0.069*** (3.410)	0.059*** (2.140)

Mean VIF	1.09	1.09	2.05	2.05
Z	0.21	0.17	0.27	0.49
F ¹	53***	56***	56***	37***
R ² (adjusted or pseudo) ¹	0.27	0.17	0.40	0.25
N	439	439	439	439

VIF

Variance inflation factor

Z OLS specifications reported normal residuals ($z = 0.21$) and these models (5.2 to 5.8) were re-specified using quantile

regression. 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; *** $p < .01$; ** $p < .05$; * $p < .10$

SR Variables transformed by square roots are prefixed with SR;

LN 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.

refers to cross-directorships or additional appointments as NONEXEC in a separate UK listed company. MVTA is taken from *DataStream*; it represents the ratio of value attributed to shareholders to total assets. GEAR is defined as the ratio of debt to equity and is obtained from *DataStream*. CNED is defined as a non-executive chair and is obtained from the annual report. EMPC is taken from *DataStream* and represents the ratio of staff cost to number of employees. SIC is the industry classification that is based on economic activity. This classification is obtained from *DataStream*, as is TechMARK listing a further industrial classification that is based on technologically innovative processes. SALES, the proxy for size in this model is defined as gross sales less discounts. A robust linear regression is run on the independent variables. The F – statistic 0.53 is significant at 1% being large this statistics indicates a linear relationship overall. The value of R^2 is 0.27, is significant within disclosure studies. Overall, the model appears robust; the sample size is large (339 observations). This research formulates the null hypothesis to determine if Model V has any explanatory power.

H_0 : all coefficients are < “0”

This research rejects H_0 when $F_{\text{observed}} > F_{\text{critical}}$. Thus $F_{(.05, 8, 439)} = 1.96$. This research therefore rejects the null hypothesis that all the variables jointly have no explanatory power in the model. As $F > F_{\text{critical}}$, H_0 is rejected and this research concludes that Model V has some explanatory power. Model V indicates 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 V, 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 8.1 and 8.2, GEAR however, which is negative in the tests of association, is positive in the regression analysis. The results of the influence of the individual variables on VDIC are presented in sections 8.3.1 to 8.3.8. Table 8.4 presents the results of the sensitivity analysis that introduce the dummy industry variables into the OLS and QREG models and WDI and DI variants. Model V has returned significant F -statistics,

confirming the existence of a strong linear relationship between WDI and the independent variables. Within the OLS model, the mean VIF indicates no collinearity and the *z*-statistics indicates that the residuals are normally distributed and within this research-defined threshold of 5% confidence for non-normality for both DI and WDI.

The sensitivity test on the dummy industry variables provides interesting results. First, as reported in Table 8.4 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 8.4, 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 8.4, 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 8.4. Consistent with Model III, coefficients in both the OLS and QREG model are consistent in terms of basic industries, engineering and retail sectors having the lowest coefficients and computer, services and electrical 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 8.4 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, this research examines the order in the size of the coefficients to establish their relative positions in their influence on VDIC. All variations of Model V are consistent in illustrating that industries with IC content generally disclose more IC than those without. In the next, section this research examines the results of the individual independent variables in order to confirm the hypothesised influence on VDIC.

8.3.1 Size

Size as measured by SALES has a positive and significant influence on VDIC. This model confirms that large companies provide more VDIC than smaller companies. The results are consistent with Model I, II, III and V, the partial correlation matrix, the Pearson correlation matrix, the OLS and QREG model and in DI and WDI in Model V. The results indicate that SALES is a key determinant of VDIC, regardless of which industry classification is applied, however the consistency in the direction and differentiation of the industry proxies provides the underlying characteristics; non-manufacturing, high technology, complexity and high technology service industries are characteristics that in the presence of high turnover result in signalling of IC. The motivation is derived from the RBV and signalling the “hidden value” that drives this large market. Being hidden, the underlying IC may not be visible; signalling reduces asymmetric information by providing information on RC, responsible for a large market share. The variable MVTA, representing “hidden value” is significant and supportive of the above motivation. Size in any country, appears to be an important explanatory variable whether measured by

TA, SALES (Firth 1979), or MV (Hossain *et al.* 1994 and Lang and Lundholm 1993). In the Firth (1979), Cooke (1989), Wallace *et al.* (1994), Depoers (2000) and Naser *et al.* (2002) studies, the sales figure, as the measure of size, is significant with a positive coefficient. The result confirms that both tangible and intangible assets contribute to the generation of turnover, SALES is therefore included as a measure of size irrespective of the IC intensity of the company. Within IC studies, size has been confirmed as positively associated with disclosure by Bozzolan *et al.* (2003), Garcia-Meca *et al.* (2005), Garcia-Meca and Martinez (2005) and Guthrie *et al.* (2006). Model V confirms that for larger companies, the benefits of signalling IC outweigh the potential disclosure costs. Being larger and having access to more resources, larger companies may be able to institute barriers to imitation. Management behaviour is explained by signalling theory as successful management practices are advertised to inform markets of the company's competitive advantage. Consistent with the disclosure of RC attributes that signal the IC embedded in the processes that expand markets, build and maintain customer relations and ensure adequate distribution channels. Therefore, this research confirms that SALES is a significant positive variable on the extent of VDIC, hypothesis H1.1: in Model V is accepted.

H1.1: Size as measured by SALES is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.2. MVTA

This research acknowledges the existence of this "hidden value" due to the inability of traditional financial statements to report SC, RC and HC. The results are consistent in all variants of Model V. Furthermore, in response to the measurement problems associated with the denominator in the MVBV ratio, the alternative proxy for the "hidden value" MVTA is associated with VDIC. 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. Management may be expected to provide VDIC to bridge the gap created by this difference particularly for IC intensive

companies in which the MVTA ratio is larger. Few studies have conducted a direct empirical investigation on MVTA and disclosure. Patton and Zelenka (1997) found no significant relationship between mandatory disclosure and percentage of IA. The motivations for an expectation of a positive association are derived from Garcia-Meca *et al.* (2005) that confirm MVBV as a positive significant variable in the voluntary disclosure of presentations to analysts. 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, these companies are expected to have a higher MVTA ratio that may proxy for the difference between intangible and tangible asset based resources. 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. Therefore, hypothesis H5.4: in Model V is accepted.

H5.4: MVTA is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.3. Gearing (GEAR)

Model V indicates that the higher the proportion of debt in a company’s capital structure, the lower the disclosure of IC. Highly geared companies use debt to finance expansion and purchase of long-term tangible assets. The results confirm that these companies do not disclose ICCA. 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. 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.

Thus, an increase in the gearing ratio (GEAR) increases the probability of financial and insolvency risk. As such, highly geared companies may not have the financial resources required for investment in IC. Additionally, highly geared companies may not have the necessary resources for investment in the processes and procedures required to identify, manage and report IC. Debt reduces 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. As indicated by Williamson (1988), debt providers might be unwilling to finance projects with high company specificity; investments in IC may be regarded as sunk costs, given that these processes and services may not be tradable on the open market. Furthermore, R&D is negatively related to its debt levels (Balakrishnan and Fox 1993 and Baysinger and Hoskisson 1989). This evidence is consistent with R&D as the driver of IA growth.

The literature provides evidence that a higher incidence of agency costs is associated with companies with a greater proportion of debt (Leftwich *et al.* 1981, p.56). This is consistent with Jensen and Meckling (1976) who suggest that companies with high gearing costs may incur higher monitoring costs. Gray and Roberts (1989) found a negative significant result between mandatory and voluntary disclosure with gearing in a study conducted in the UK. From an international perspective, Meek *et al.* (1995) and Eng and Mak (2003) identified gearing as negatively affecting the extent of voluntary disclosure. The results are consistent with Balakrishnan and Fox (1993) and Baysinger and Hoskisson (1989) who find that highly geared companies have less R&D investment that may lead to less IC disclosure. The arguments are based on agency theory; management may decrease VDIC; by increasing asymmetrical information management are able to perpetuate their positions in office. Furthermore, 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. This research concludes that in Model V, hypothesis H4.4: is accepted.

H4.4: Highly geared companies are more likely to provide less VDIC than less geared companies are.

8.3.4. TechMARK Listing

Companies that have been admitted to the TMRK listing are associated with higher levels of IC disclosure relative to non-members. Previous industry studies by Bozzolan *et al.* (2003), Williams (2001) and Cooke (1989, 1991 and 1992) yielded significant results. This variable TMRK is significant at 1%. The understanding is that a listing on the innovation technology index is a result of an intensive long-term plan to invest in and maintain investment in IC as such the index cuts across all industrial sectors. The company's business growth and success must be dependent on technological development or innovation. Such companies are involved in innovative business, with new products or services, or new methods of business, with existing organic growth in revenue, historic and prospective, arising from the innovative business and relevant management expertise that has to be demonstrated to the satisfaction of the LSE before any listing takes place (FTSE 2006). The general trend has been that innovative technology companies disclose more than non-innovative and non-technological companies do as they signal superior IC potential.

Analysts and investors associated with these industries may demand additional disclosures to clarify the issues arising from the MVBV phenomenon. Furthermore, competitive pressures and the need to signal a competitive advantage motivate management to a maximum disclosure policy as they increase VDIC. The theoretical motivation is derived from the RBV and signalling theory. As these high-tec companies may have IP, licenses, patents

and brands, the potential disclosure costs are exceeded by the potential benefits of increased disclosure of proprietary information. Investment in R&D, innovation and technology requires substantial financial investment, skilled employees and adequate marketing including listing on the TMRK. These innovative technology companies include computer hardware, computer servicing, internet, semi-conductors, software, telecom equipment, biotechnology, specialist pharmaceuticals, drug delivery and medical technology. Management of these companies signal this investment, indicative of procedures to accumulate competitive advantage by disclosing ICCA. Potential wealth increases are attributed to VDIC whilst competitive costs are expected to suppress VDIC. TMRK is positively associated with the extent of VDIC in all variants of Model V. The conclusion for this variable therefore is that hypothesis H3.1: is accepted.

H3.1: TMRK is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.5. SIC

Model V indicates that SIC is statistically significant at the 1% level with WDI in the partial correlation, the Pearson correlation, the OLS model and the QREG model. These results are mirrored by the sensitivity test that is based on DI; however, the QREG model provides the only insignificant result that indicates that TMRK may be sufficient in controlling for industry reporting trends. Due to the increasing IC content in ascending SIC code, the expectation of a relationship with WDI is confirmed in all other variants of Model V including the univariate analysis. Forestry and paper, food producers and processors, beverages and tobacco, the most basic industries disclose little ICCA whereas the telecommunications, media and entertainment, health, leisure and hotels, the more complex service industries disclose more ICCA. The motivations are derived from the RBV and signalling theory. Service and highly complex companies are expected to apply IA and IC, unique to their organisation and therefore not easily replicable. The benefits of disclosure of ICCA outweigh the disclosure costs that may be associated with the disclosure

of proprietary information. These companies may disclose ICCA attributes due to the lack disclosure costs, consistent with disclosures in sectors of high barriers to imitation. Archambault and Archambault (2003) and Citron *et al.* (2005) find a strong positive association between disclosures and the number of SIC codes in the firm indicating that operating in a large number of distinct industries may lead to increased disclosure as companies seek to obtain a greater set of resources (Zarzeski 1996) or because of increased diversification (Verrecchia 1983). Management may increase VDIC to illustrate their competitive edge particular in areas where there are no disclosure costs and adopt a partial disclosure policy in areas where proprietary costs may be mitigated. Furthermore, the more complex service orientated companies may be disadvantaged by the current reporting regime that is biased for companies whose equity is mostly intangible and therefore not represented in the financial statement. VDIC provides the means for such companies to signal their growth potential and signal the underlying reality. The conclusion for this variable therefore is that hypothesis H3.4: is accepted.

H3.4: SIC is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.6. Employee cost (EMPC)

Model V indicates that increasing remuneration per employee positively influences VDIC. Increasing salary cost per employee may be attributed to higher levels of education, more experience and highly complex professions. In an environment in which measurement of HC is complex, EMPC is a proxy for the value of HC in companies or alternatively, the rent required to maintain the HC in place. The motivation for this hypothesis is based on signalling theory. Proprietary costs are mitigated in the first instance by the perceived benefits of signalling and in the second by the disclosure of “better than the worst case scenario” that the markets would have assumed. This signalling is consistent with investment in training, health insurance and pension plans as employers signal their successful investment in HC through VDIC.

An additional explanation may be found in employee pressure that labour unions may exert on corporations. Trade unions may support employees in bargaining, requiring more disclosures from management. The dependence of the company on employees as a resource without which the company cannot operate and that may not be easily replaced due to specialisation, may mean management accede to employee demands for additional VDIC. This variable confirms the expectation that companies with high levels of HC content do disclose ICCA. Table 4.1 confirms that 70% of companies disclosed entrepreneurial spirit and 61% of companies disclosed innovativeness, the two most reported IC attributes. The demand for information from this stakeholder group may be specific and therefore require more disclosure in particular with respect to HC. Such companies are likely to be highly IC service orientated and may therefore provide more VDIC to mitigate the MVBV dilemma. Disclosure costs include risk of pressure from labour unions and other regulatory bodies. Pressure from competitors too, may curb full disclosure due to the mobility of employees in some industries.

The arguments for the association are derived from signalling theory and the propensity of companies to disclose their competitive advantage. These motivations are expected to outweigh any competitive pressures and labour related proprietary costs that are associated with such disclosures. The literature has indicated that disclosure is associated with various measures of HC. Singhvi (1968) and Wallace (1987) reported a significant relationship between management type and mandatory and voluntary disclosure. The results of variables that are derived from individuals within management have generally been insignificant; these results raise questions as to the influence of individuals on the disclosure decision. Ahmed (1996) found no relationship between mandatory and voluntary disclosure and qualifications of the accounting officer. In addition, an insignificant relationship was established by Haniffa and Cooke (2002) between the qualifications of the financial director and voluntary disclosure.

The theoretical explanations are taken from signalling theory, Model V indicates that the relationship is significant and positive; higher EMPC may be associated with a more skilled work force, therefore companies with higher EMPC may be characterised by higher levels of HC content. Such companies

are likely to be highly IC service orientated operations and may therefore signal ICCA. The expectation of a significant positive relationship is confirmed. Effective human resource practices are expected to lead to signals that indicate competitive advantage to the markets. The conclusion for this variable therefore, is that hypothesis H5.1: is accepted.

H5.1: EMPC is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.7. EXPRCD

Model V confirms the hypothesis 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 8.4). Both the OLS and QREG models provide consistent results, in addition the qualitative and quantitative indices support the significant association. In Table 8.4 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 *et al.* 1996). The results confirm that EXPRCD has 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 IC.

The literature has reported varying results. In the UK, Lufti (1989) reported insignificant results on the influence of NONEXEC on voluntary

disclosure; in the US Malone *et al.* (1993), reported an insignificant result between mandatory and voluntary disclosure and proportion of outside directors. Both Ho and Wong (2001) and Haniffa and Cooke (2002) applied agency theory and reported insignificant results.

Studies in favour of NONEXEC' domination on boards includes Kesner and Johnson (1990) and Grace *et al.* (1995). The motivation is based on agency theory and the monitoring role of EXPRCD. Support for a positive association is derived from Adams and Hossain (1998) and Chen and Jaggi (2000) who found empirical evidence of a positive relation between proportion of independent directors and mandatory disclosure. Deakin and Konzelmann (2004) however report on the complexity of the monitoring role of NONEXEC. They suggest that Enron's NONEXC were as well qualified as any group of outsiders could have been to judge the regulatory and business risk that arose from company operations, however their failure to identify these risk places questions on corporate governance reformers insistence on independence for NONEXEC.

This approach is consistent with Eng and Mak (2003) who find that outside directors reduce corporate disclosure. Eng and Mak (2003) suggest that one reason for this result is that NONEXEC may be a substitute for voluntary disclosure. Another reason put forward is that NONEXEC may not be truly independent; EXPRCD may not be truly experienced as cross-directorships within similar business cultures may only yield common knowledge. Malone *et al.* (1993) find no evidence of the influence of NONEXEC on disclosure quality; similarly, Leung and Horwitz (2004) find no support for better disclosure attributed to NONEXEC; they suggest that the presence of high director ownership mitigates the monitoring role of NONEXEC.

The results of this research indicate that on average UK DIRSHS is 8% and may not be sufficiently large to influence the EXPRCD mandate. Despite the inconsistent results in the literature, inconsistent results of the bivariate analysis and the insignificant result in the OLS WDI dummy variables variation of Model V, this research concludes based on the Full Model (WDI), Model V is consistent with the expectations generated by the theoretical basis, therefore, hypothesis H8.1: is accepted.

H8.1: The proportion of EXPRCD to total directors is a positive significant explanatory variable of the variation in the extent of VDIC.

8.3.8. Non-executive Chair (CNED)

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 V 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 IC, 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, this result is consistent with Model IV. The results obtained from studies on independent board leadership as measured by CNED and executive chair have been mixed concluding overall that there is no significant difference in performance between executive and non-executive board chairs in Chaganti *et al.* (1985, cited by Davis *et al.* 1997) and Molz (1988, cited by Davis *et al.* 1997). Nevertheless, Dahya *et al.* (1996) concluded that the market responds favourably to the separation of the roles of chair and CEO and that accounting performance of companies adopting a “dual CEO” declined subsequent to this change. The results are consistent with Dalton and Kesner (1987) and Worrell *et al.* (1997) who argue that dual roles compromise board independence and may lead to conflicts of interest that may negatively influence shareholder value creation.

According to agency theory, the combined functions of chair and NONEXEC can significantly impair the board’s most important role of monitoring, disciplining and compensating senior managers (Barako *et al.*

2006). Lack of segregation of duties may provide the opportunity for opportunistic behaviour. Forker (1992) concluded combined roles in the executive signalled the absence of separation of decision management and decision control (Fama and Jensen 1983). The results and the literature suggest that the combined role of CNED is likely to require increased monitoring, the direction of the relationship is negative and significant therefore hypothesis H8.4: is accepted.

H8.4: The CNED is a negative significant explanatory variable of the variation in the extent of VDIC.

8.4.0. Conclusion

The results establish a relationship between VDIC and various IC, risk, industry and corporate governance variables. The empirical evidence confirms the existence of a relationship between the independent variables and IC disclosure. The theoretical approach explains the reason why these relationships exist. Furthermore, the results fit the specification of the model. Model V confirms that for larger companies, the benefits of signalling IC outweigh the potential disclosure costs. 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. Highly geared companies may not have the financial resources required firstly for investment in IC; secondly, highly geared companies may not have the necessary resources for investment in the processes and procedures required to identify, manage and report IC. The general trend has been that innovative technology companies disclose more than non-innovative and non-technological companies do as they signal superior IC potential. Service and highly complex companies are expected to apply IA and IC, unique to their organisation. The benefits of disclosure of ICCA outweigh the disclosure costs that may be associated with the disclosure of proprietary information. Higher EMPC may be associated with a more skilled work force, therefore companies with higher EMPC may be characterised by higher levels of HC content. Such companies are likely to be highly IC service orientated and may therefore signal ICCA. 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 IC. Non-executive chairs are associated with less VDIC, supporting the view that the position of chair and non-executive director should be separated. According to agency theory, the combined functions of chair and NONEXEC can significantly impair the board's most important role of monitoring, disciplining and compensating senior managers

In summary, investment in IC is an important aspect in IC disclosure. Activities that encompass investment in employees and IP, customer relations and other external links, generally regarded as drivers of IC growth lead to the generation of "hidden value" that is disclosed as narratives and non-narratives in the annual report. Secondly, the high financial risk is not commensurate with VDIC. Thirdly, membership of the TMRK listing, technologically innovative activities, complex and service industries are characterised by higher levels of ICCA disclosure. These industries include companies associated with the pharmaceutical, electric, services and computer sectors. Fourthly, segregation of executive and non-executive functions and appointment of experienced non-executive directors include some of the necessary corporate governance mechanism that reduce agency costs through monitoring controls. Investment in corporate governance mechanisms adds to the SC of the organisation by developing and maintaining the management philosophy, corporate culture and management processes. This research identified agency theory, proprietary cost hypothesis, RBV and signalling theory as explanatory hypotheses for the influence of IC investment, risk, industry membership and corporate governance on IC disclosure.

9. Conclusion

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9.1.0. Introduction

VDIC is an important area for academic research particularly for innovative and technologically advanced companies. Applying the RBV this research has confirmed the differentiation between inimitable IA resources and easily replicable tangible assets resources. These IA resources are not included in the traditional financial reporting model due to their complexity in identification, measurement and valuation. Having been set up to allow managers to account for shareholders funds, the balance sheet and income statement may not be ideal for reflecting the value created by synergies within the company and the resultant competitive advantage. The intangible nature of IC makes its valuation more complex than traditional tangible assets. Nevertheless, the MVBV dilemma provides evidence of “hidden value” within such companies. Given that tangible assets are valued, management has the onus to signal IA that are not valued. The narratives, diagrams and illustrations provide a framework for these disclosures. This research has confirmed that companies with higher levels of “hidden value” may signal the existence and performance of these IA as they provide competitive advantage. However, proprietary costs have been found to lower IC disclosure when companies are involved with higher levels of R&D. Markets may not only acknowledge R&D, but may place value on successful R&D that may provide competitive advantage.

This research has examined the influence of market risk and firm specific risk on VDIC; it confirms that lower financial risk appears essential for the investment and disclosure of IA. In addition, high levels of information asymmetry may result in higher levels of VDIC as management reduce market risk and that whilst the existence of firm specific risk induces lower levels of VDIC due to agency costs and management’s self-interests. Corporate governance mechanisms ensure that management self-dealing is restricted and that adequate monitoring and control is evident. Such accountability and transparency through adequate segregation of functions and the existence of experienced non-executive directors encourages IC disclosure. Furthermore, it may be that such governance functions may adequately manage the identification, measurement and reporting of IC. This research confirms that governance has a positive influence on IC disclosure. The explanations based

on agency theory have been accepted. Directors' shareholdings have not had a significant influence on IC disclosure due to the power struggles that take place as shareholding increases. IC disclosure may mitigate the risk companies face if they do not communicate IA resources. These key drivers of competitive advantage may be signalled to analysts and investors as well as to all stakeholders to ensure that all value drivers are disclosed.

This chapter begins by reviewing the research questions and identifying the areas in which these objectives have been achieved. This is followed by overall conclusions based on the research objectives and practical implications. It then summarises the research's limitations and concludes by suggesting areas for further study. The development of the context of this research is made possible by establishing a VDF, ICF and a TF. The VDF successfully identified that only company names are regulated as mandatory within the ICF indicating that within the context of the UK, companies are able to exercise their own discretion in deciding on the extent of VDIC. The TF provides explanations for the possible disclosure outcomes. The hypothesised influence of selected independent variables has been confirmed with the exception of DIRSHS and R&D that have proved not to be a positive determinants of VDIC. The results reveal that various internal and external factors influence management's IC disclosure policy. The theoretical approach has been confirmed by the accepted hypothesis. The explanations have generally been attributed to signalling theory, proprietary cost hypothesis, RBV and agency theory. Overall, the new frameworks, models and methods introduced into this research, provide robust results and present a significant contribution to accounting research in both disclosure studies and in IC research.

9.2.0. Research Questions

Companies do use IC attributes to convey their IA, in addition, all IC attributes included in the ICF were disclosed by one company or another, furthermore all companies disclosed some IC attributes as no company had a DI of "0". As the disclosure of IC is intrinsically narrative, the quantity of disclosure is not a satisfactory proxy for the quality of disclosure. This quality is dependent on the quantity but more importantly, the richness of the content as such WDI has

afforded a better result than DI in some cases; in other cases, DI provides supporting if not better results than WDI. As such, DI cannot be a substitute for WDI nor WDI for DI. Nevertheless, comparatively results are consistent across parametric and non-parametric tests. This research was able to identify that the most disclosed IC attributes are HC attributes, entrepreneurial spirit, innovativeness and know-how. Nevertheless, RC is a category with the most IC disclosures overall. It appears that customer relations and marketing strategies are more important to management. Copyrights (SC), vocational qualifications (HC), franchising agreements (RC), licensing agreements (RC), financial relations (SC), patents (SC) and trademarks (SC) have been shown to be the least disclosed IC attributes. This research has established a difference between WDI and DI as 33% of companies disclose ICCA and 48% disclose IC attributes providing further support for the use of dependent variables modelled on different constructs. Model V illustrates the importance of having two separate indices as the regression results have differed where a different dependent variable has been applied.

Overall, existing theory explains management's disclosure choices. As IC is characterised by certain unique elements including competitive advantage, ownership issues, barriers to imitation, competitive pressures and political costs, the challenge of dealing with IC is compounded in that SC, RC and HC are interrelated. The TF addressed the varying circumstances by examining explanations based on internal (agency theory), political (signalling), RBV and proprietary cost hypothesis. Model I represents IC investment and Model III investigates industry membership, both models are associated mainly with the RBV and signalling theory; IC content leads to specific IC reporting trends within certain sectors, in response to this value creation process management signal the existence of this "hidden value" that would otherwise remain invisible. Model II confirms the hypothesised influence of accounting risk measures on VDIC through agency theory in the case of BETA and GEAR, and through signalling theory in the case of LQD.

In Model IV, the focus is on corporate governance mechanisms the motivations of which are derived mainly from agency theory; the model confirms that transparency and accountability, separation of executive roles and increasing the ratio of EXPRCD to executive directors significantly reduces

agency costs through the monitoring function enabled by the various components of the executive board. Generally, in all models the results have been consistent with the theoretical explanation and with the direction of the predicted sign. Additional variants of this Model IV have been conducted to ascertain the true association; the use of both the OLS and the QREG models and the use of dummy DIRSHS variables have provided sufficient assurance as to confirm the negative significant association. It is suggested that entrenchment costs may dominate agency costs and mitigate VDIC. The results overall, confirm the adequacy of the theoretical approach for the empirical investigations conducted in all Models.

- (a) What are the resource attributes that tend to lead to competitive advantage reporting?

In Model I, the results support the hypothesis based on investment in IC leading to VDIC. The theoretical approach based on signalling and the RBV is confirmed. Non-replicable resources may be disclosed due to their specificity to the organisation and therefore lack of proprietary costs. The need to generate competitive advantage drives the disclosure of inimitable IA resources; companies signal successful investment in IC through voluntary disclosure. The results indicate that VDIC by non-manufacturing service, highly complex and high-tech companies characterised by high levels of intangible value is greater for large companies; nevertheless, the results suggest that R&D activities do not necessarily lead to VDIC, consistent with explanations provided by the proprietary cost hypothesis. SIZE, R&D, TMRK, MANUF and EMPC represent market share (RC), IA generation (SC), IP and technological applications (SC) and investment in employees and employee welfare (HC) respectively as measures of the investment in IC. R&D provides a weaker association under the QREG model but significant in the OLS model. These variables extend disclosure studies that have generally considered R&D as the only representative of IC in company financial statements. The expectation of R&D companies to have high levels of VDIC is rejected. Research has indicated the irrelevance of financial statement reporting in illustrating the “hidden value”; this leads management to disclose HC as a representative of

EMPC, SC as a representative of IP, R&D and TMRK and RC as a representative of size of market share.

- (b) What are the market and financial risk characteristics that lead to IC reporting?

In Model II, an empirical relationship is established overall between VDIC and risk. All accounting and market measures of risk are significant in either the OLS or the QREG model. LQD and GEAR are dominant in their association with VDIC whilst BETA presents a weaker association. This research has illustrated that the level of systematic and unsystematic risk influences the extent of VDIC. The explanations based on agency theory have been accepted. Generally, companies exposed to more firm specific risk, financial risk and lower levels of liquidity do not disclose IC through narratives, non-narratives and illustrations. Disclosure of information is reduced when financial and insolvency risk increases, due to the negative impact on managerial performance and resultant agency costs as management forestall potential replacement. Furthermore, lack of financial resources may hinder IC investment essential in shareholder value creation.

- (c) What resource attributes lead to innovative and technological industries disclosing more IC?

Model III indicates that TMRK, MANUF, INDG and SIC are significant in explaining the variation in VDIC. Pharmaceutical, electrical, services and computers disclose the highest number of IC attributes. These results are consistent with companies listed on the TMRK exchange, companies associated with service and complex activities and companies characterised by non-manufacturing. Basic resource, engineering and retail companies disclose the least number of IC attributes. These industries are consistent with manufacturing companies, heavy industries and generally tangible assets intensive industries. Industry dummies provide assurance as to the reliability of the model. Variables SIZE, GEAR and MVTA are determinants of VDIC whether the industry classification or dummy variables are applied. As is the

case with TMRK at the LSE and the German equivalent, *Neuer Markt* at the Frankfurt Exchange that targets technological companies, some industries may require higher mandatory disclosure levels due to the nature of their activities.

Tayles *et al.* (2005) suggests that conventional financial reporting for IC and intangibles has limited scope particularly in the context of the companies whose background and activities move from traditional manufacturing to virtual manufacturing. Internally, the organisation's strategy, the reporting practices adopted and integrated into this strategy, measurement of successful or unsuccessful IC, culture of management towards IC development and human resource management of the function may be more important than identifying a value for these IA. High levels of IC in an industry do not necessarily lead to higher levels of IC disclosure due to disclosure costs. This research concludes that IC content within industries is significant in influencing VDIC trends within industries and that corporate governance plays an important role in transparency and disclosure.

(d) Which corporate governance mechanisms promote IC disclosure?

Corporate governance variables included in Model IV provide evidence of an association with IC disclosure. Generally, companies with corporate governance mechanisms are more likely to disclose IC attributes through narratives, non-narratives and illustrations, thus as accountability and transparency increase, so too does the level of IC attribute disclosure.

Corporate governance mechanisms have been confirmed as decreasing agency costs through segregation of duties and through appointment not only of non-executive directors but also of experienced non-executive directors. Consistent with EMPC, higher levels of executive remuneration lead to higher levels of VDIC. In contrast, DIRSHS is negative and significant only once total executive share ownership exceeds a threshold level; the results indicate that the negative association is more significant between 30% and 50% equity share, illustrating the existence of entrenchment strategies. Sensitivity tests on DIRSHS provide supporting evidence for the negative association found in the variable. With increasing equity ownership, management may initially align their goals with those of shareholders and then progress to ensure firstly, their

minority interests are protected and then with further increases, apply entrenchment strategies aimed at exploiting the widening power base; these strategies are generally associated with decreased disclosure.

The regression results of Model V indicate that larger companies from technologically innovative, service and complex industries that are characterised by low debt levels are able to generate significant “hidden value”; this IC is signalled to the markets due to the transparency and accountability associated with companies with separate chair and NONEXEC and with a significant number of experienced NONEXEC. Investment in HC is important, as the presence of suitably qualified and salaried employees is essential for the success of IC disclosure.

The results of the QREG model indicates that WDI is a continuous variable and not discrete, furthermore, that the results are consistent in influence and direction with the results of the OLS regression. The objectives of Model V are achieved in firstly identifying the difference between the un-weighted index DI and the weighted index WDI. The results indicate that both indices return a high F – statistic 56 and 53 respectively, a high R^2 of 0.27 and 0.27 respectively indicating that there may be little difference between weighted and un-weighted indices.

Nevertheless, variability in the association between DI and WDI and selected independent variables, CNED, EXPRCD and SIC may indicate that one dependent variable cannot be replaced by another, as such there are benefits to be gained from the use of a quantitative and a qualitative disclosure index as indicated by Tables 8.1 and 8.2. The second objective in Model V, confirms that the combined influence of selected accounting risk measures, IC investment measures, industry membership classification and corporate governance mechanisms have the greatest explanatory power in the Models I to V. These results are enhanced by the application of dummy industry variables that report supporting if not better results. These results suggest that SC, RC and HC are interlinked; when applied together the individual categories of IC provide greater effectiveness and efficiency on VDIC than when applied individually.

Furthermore, the combination of the four focus groups in Model V has increased the explanatory power of the regressions providing supporting

evidence for the initial selection of these areas as important to VDIC. Overall, the results are robust and consistent with the expected sign. Nevertheless, the results of rejected and insignificant hypotheses have provided important knowledge in the development of empirical work on the variables that influence VDIC in particular with respect to R&D and directors' shareholding.

9.3.0. Policy Implications

This research has identified that disclosure of IC is not regulated and generally governed by market forces. These forces lead to various self-regulatory practices. Information asymmetry between management and markets may be due to IC information that falls outside the traditional reporting framework. Consequently, interest continues to grow with respect to the reporting of such IA outside the audited financial statements. The wide range in the disclosure the IC disclosure patterns of companies and in the IC attributes and categories disclosed are indicative of management's perception that the different types of IC attributes are valued differently by the market. The variation in the level of IC disclosure throughout the sample companies suggests that some companies may require increased disclosure to meet market demands and other companies may be disclosing in excess of market requirements. Mandatory regulations need to be aimed at a point that benefits both disclosing and non-disclosing companies whilst ensuring market information needs are met.

This research provides a significant and important original contribution to the literature. This research has identified the lack of an established commonly accepted IC framework as the limitation on IC reporting levels. Regulations may encourage more widespread and uniform disclosures that are expected to meet at least the minimum market requirements for all companies and sectors. However, there is an advantage to not mandating high levels of IC disclosure, as there is likely to be cross-sectional variation in the demand for this information. As such creating a standard policy may create unnecessary costs for some companies. This section therefore summarises the main conclusions and implications for policy makers arising from the analysis of the current IC disclosure practices of UK listed companies:

- (a) The definitions of IC attributes should be standardised and differentiated between static IC (registered trademark) and active IC (R&D activity)
- (b) There should be greater clarity between IC attributes that are regulated and those that are voluntary
- (c) There should be greater clarity between audited and un-audited IC information in annual reports to ensure that narrative and non-narrative disclosures are credible
- (d) Accountants and auditors should involve themselves in the development of IC reporting practices as the influence of salient measures inherent in IC disclosures has become more widespread and therefore more important. Continued adoption of accounting standards in their present form exacerbates the misconceived idea that a conservative approach is prudent and minimises information errors, however the consequences are that this stance gives rise to errors of valuation. Whereas accounting standards should be aimed at minimising both over- and under-statement errors.
- (e) IC attributes, including narratives and non-narratives, words, sentences, pictures and diagrams are being increasingly used to communicate IA as such, it may be necessary to include training and development for all stakeholders involved in annual report preparation, review, analysis and audit and in IC regulation

Important original contributions by this research include the introduction of the four focus areas and the identification of the manner of their individual effect and aggregate influence on the variation in the extent of VDIC. The introduction of a quality signalling approach combined with the RBV as the theoretical basis for the hypothesised influence of possession of IA resources leading to disclosure of competitive advantage. Furthermore, the

introduction of sensitivity tests with respect to variables included in the models size, industry and “hidden value”, with respect to the dependent variable, WDI and DI, with respect to the empirical analysis in the QREG and OLS models and in addition with respect to the dummy variables introduced for industry and DIRSHS. This contribution is based on those financial measures that have been shown to capture the essence and underlying construct of IC found in equities and influenced by IC investment, financial and market risk, industry membership and corporate governance mechanisms. Additional contributions are listed below:

- (a) An up-to-date analysis of the IC reporting practices of 439 UK listed companies selected from various industries
- (b) An application of new methods including the development of an IC based VDF, an ICF and a TF for the UK context
- (c) An application of new sampling, attribute counting, statistical and analytical tools particularly in the development of a measure of competitive advantage, the introduction of both a weighted and unweighted disclosure indices adds to the development of IC management and reporting studies
- (d) New methods are applied in the analysis of qualitative statements, discretionary sentences, diagrams and graphs, illustrations, non-narratives and narratives in providing the first attempt at a methodological recording of the content and style of ICCA disclosure
- (e) An introduction of an expansive empirical study in IC studies in the scale of this research and have significantly added to accounting research (new independent variables have been introduced increasing the count from an average of 3 to 8 within the IC disclosure literature)

- (f) The statistical procedures applied in the empirical tests are new to IC disclosure studies and provide an important contribution through the methodology, methods, quantitative and qualitative techniques, data analysis and statistical tests applied.

9.4.0. Limitations of this Research

Whilst adding to our understanding of VDIC this research has limitations, which should be acknowledged. This research has examined VDIC at the corporate and attributes level. A broader approach may have been to examine voluntary disclosure at the national level. The fast moving and developing nature of IC renders this research time specific as this research is founded on data currently available in listed companies for the year 2003/2004. As only annual reports were examined, the first limitation is that management provide VDIC through other channels such as interim annual reports, press releases, conference calls and on-line announcements; other reporting channels could have been examined or included in this research.

The second limitation was encountered in the selection and justification of variables to include in the different models. The focus of this research provided some direction; generally, industry variables controlled for sector differences, other variables of interest included SIZE and GEAR identified in the disclosure literature as having a significant influence on disclosure, both in mandatory and voluntary studies. The availability of accounting data on IC is tied in with this limitation, as few IC measures, representative of SC, RC and HC are accounted for in the traditional financial statements.

The third limitation was the non-normality of the data. Although transformations are applied, skewness and kurtosis remained high for certain continuous variables. The methodology applied however, successfully accounted for these statistical problems as residuals for all models achieved 5% for normal distribution. Although the OLS specifications reported non-normal residuals, these models were re-specified using the quantile regression. The fourth limitation is tied in with the TF and is attributed to the need to identify the most appropriate theoretical framework, given the lack of theory in prior studies. Overall, the results indicate that the correct theoretical approach was

applied. Nevertheless, the results of DIRSHS do not confirm agency theory as the basis for the association and the results of R&D do not confirm signalling as the correct theoretical basis due to the entrenchment costs associated with management share ownership and the competitive costs associated with R&D respectively.

The fifth and final limitation relates to the accounting framework and the influence of the accounting theory debate and its overall influence on the context of this research. Generally, the lack of accounting for intangible value has led to financial statements reporting an ideology rather than reality. As long as accounting theory dominates this dilemma, the value of IC will remain intangible and is not likely to be included on the balance sheet. Although some academics believe that companies should dwell not on the measurement but on the process of strategic management of IC to gain competitive advantage, internally this process may be relevant for management's valuation purposes however in the wider market, measurement, management and reporting will remain of paramount importance if equity is to be adequately valued.

9.5.0. Areas for Further Research

This research has provided an extensive analysis of the current IC reporting practices of UK listed companies however, further areas have been identified, areas in which more knowledge can be gained with respect to IC. Future research might try the following suggestions by introducing new voluntary intellectual attributes not addressed by the current study. These new attributes may include reputational capital, corporate image, credibility, status and additional corporate governance structures.

The disclosure indices were constructed by this researcher, an alternative approach may involve third parties in developing a weighted index by applying a user created hierarchy of IC importance. As a cross-sectional analysis, this research was unable to capture the variation of the extent of disclosure over time, measuring the level of disclosure longitudinally may establish certain associations not identified here as IC is continuously developing. Furthermore, changes in management structures from year to year

may have an effect on the four focus areas identified in this research particularly with respect to corporate governance mechanisms.

An interesting recommendation for further research would be to investigate individual disclosure indices of SC, RC and HC as the dependent variables. Such an investigation may reveal different determinants for the extent of voluntary disclosure of SC, RC and HC; these respective determinants may include identifiable accounting measures i.e. financial measures of patents for SC, measurable characteristics of customer capital including brands and financial measures of HC including investment in, cost or other accounting measure for employee capital. Such an investigation may provide results similar to those of Klock and Megna (2000, p.527-528) in the wireless communications industry that indicate that certain specific sources of intangible assets, advertising, R&D, radio spectrum licenses and measures of installed customer bases explain a statistically significant portion of the variation in Tobin's q . In addition, high average q exceeding ten is attributed to the failure of financial accounting statements to reasonably value licenses. In this way, areas of closer association and areas of less significance may be identified given that this research has identified that the level of disclosure of SC, RC and HC is different for each company. Furthermore, results of such analysis may develop a more structured and theoretical IC framework.

The risk attached to equities is dynamic and any internal changes may be perceived by markets to either increase or decrease risk. Companies are becoming increasingly aware of the importance, effectiveness and efficiency of investment in IC. This awareness continues to accelerate management's development and maintenance of these IA resources to the extent that several authors in different countries have identified an increase in IC application and reporting. Although the process of disclosure policy change may take place over time, future research should continue to assess the rate of change to enable application of a longitudinal study when the industry becomes more dynamic and the process of change accelerates. This research has extended the results on industry from single sector to a multiple industry analysis. The classification of these industries has been necessarily IC based. Perhaps the results may have been different if a different classification had been applied, or if different combinations of industries had been examined. Future research might explore

the relative significance of a comparative study between two or three EU member countries or further a field, between an EU member country and other developed or developing country. Such an investigation may identify the influence of developed or developing financial markets on corporate governance functions and therefore on IC reporting.

This research has examined the annual reports as the culmination of several processes and procedures applied to communicate IC. A wide variety of IC attributes is communicated through words, phrases, sentences, inferences, salient messages, pictures and diagrams. This process and procedures may form the basis of future studies on annual reports given that their design, collation and structure encapsulates a set of audited financial statement, un-audited narratives, voluntary and mandatory regulations, views from management and increasingly an element of marketing that is provided by external expertise in publishing. This alternative approach could examine the actual construction of the annual report and identify first hand at each stage the conflicting or complimenting forces that lead to a certain level of ICCA disclosure.

Larger companies operating in high-tech and innovative industries are characterised by investment in higher levels of “hidden value” sufficient to motivate increased IC disclosure. Reduced firm-specific risk including less financial risk, reduced debt and higher levels of liquidity provide the resources and the incentives necessary for VDIC; increased market risk is indicative of asymmetrical information and disincentives for disclosure although this association is found to be weaker. Incentives to disclose are complimented by companies’ maintenance of adequate governance systems through segregation of executive and non-executive duties and to a less extent through the presence of experienced non-executive directors on the board.

Areas for further research may also include the influence of the audit profession on VDIC. Are intangibles auditable given the lack of a mandate to do so; a move from rules to principles based auditing may require judgement that is more professional and skills that are more interdisciplinary. The informal view of the IASB is that the current disclosure requirements are out of date, as information provided does not always reflect economic conditions, minor amendments to existing regulations may not be sufficient to address the deficiencies. The IASB’s project proposals options include full recognition of

IA, measurement and disclosure of intangibles, disclosure only and the amendment of parts of IAS 38. These proposals however have been hindered by mixed feedback from the user community. The little progress made in introducing an intangible asset taxonomy that may lead to mandatory disclosure may be indicative of certain stakeholders' preference for non-disclosure of intangibles. Analysts, investors and stakeholders may stand to gain by utilising the existence of asymmetrical information either through non-disclosure by the firm or through the requirement for additional information processing costs.

However, the current practice in firms lacks adequate procedures to collect, manage and report the investment in intangible resources. In general, intangible resources have no reporting standards as such there are no IC auditing standards and therefore intangibles need an alternative to the traditional audit methodology. As such, some practitioners suggest that the annual report is irrelevant with respect to intangibles disclosures and that management should look at other media, conference calls, web sites, face-to-face discussions and other publications to provide up to date IC information.

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Cerf (1961) US	General mandatory and voluntary	527 US companies	Multivariate linear regression	Information costs, capital need, proprietary costs, political costs, capital need, support continuance and compensation, listing requirements,	31 weighted items	Size (assets), number of shareholders, profitability (rate of return), listing status		
Singhvi (1968) India		45 listed companies	General Mandatory and voluntary, systematic sampling from 500 largest US corporations	Information costs, capital need, proprietary costs, political costs, professional education, signalling, support continuance	34 unweighted items	Size (assets), type of management (foreigner), profitability (rate of return), profitability (earnings margin)		Number of shareholders, audit firm,
Singhvi and Desai (1971) US		55 unlisted and 100 listed companies	General Mandatory and voluntary, systematic sampling from 500 largest US corporations	Information costs, capital need, proprietary costs, political costs, professional management, listing requirements, reputation costs, support continuance and compensation, signalling	34 weighted items (adapted from Cerf (1961) step-wise multiple regression	Size (assets), number of shareholders, listing status, audit firm, profitability (rate of return), profitability (earnings margin)		
Buzby (1974) US	Mandatory and voluntary	88 small-medium sized companies 1970-1971	Weighted index, matched pair, descriptive study	Mailed questionnaire survey	Index based on 131 financial analysts, 39 weighted items	Extent of disclosure small, Overall mean disclosure 51.2%		
Buzby (1975) US	Mandatory and voluntary	88 companies 44 unlisted OTC, 44 listed NYSE & AMEX, 1970-1971	Matched sample based on assets size, fiscal year end and ESIC industry codes	Information costs, capital need, proprietary costs, political costs	39 weighted items, based on 131 financial analysts	Size (assets)		Listing status

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year)</u> <u>Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Firth (1979) UK	Voluntary	40 unlisted and 140 listed companies	Univariate	Capital need, information and political costs	48 weighted voluntary items	Size (capital employed, sales) and listing status		Audit firm
McNally <i>et al.</i> (1982) New Zealand	Voluntary	103 non-financial non retail listed companies		Information costs	54 items	Size (assets)		Rate of return (net income to total assets), growth, audit firm, industry
Firth (1984) UK	Voluntary	100 manufacturing companies	Financial analysts weighted index, multiple regression	Agency theory	48 items of voluntary disclosure	Systematic risk, size		Unsystematic risk, variance of return, leverage, earnings beta, dividend yield
Watts and Zimmerman (1986) UK	Voluntary	212 British financial executives UK listed companies with turnover > £100M	Likert scale questionnaire,		Disclosure items compiled from international standards, prior research and current issues	Size, gearing, and profitability		Multinationality, geographical diversity,
Chow and Wong-Boren (1987) Mexico	Voluntary	52 listed manufacturing companies	Weighted and unweighted score, cross sectional multivariate regression analysis	Agency theory	Extent of disclosure of 24 financial items from pronouncements, text and prior studies	Size (Market value of equity plus book value of debt)		Leverage and fixed assets
Wallace (1987) Nigeria	Mandatory and voluntary	87 non-financial listed companies	Extent of disclosure based on 6 user groups		120 mandatory and 65 voluntary items	Size (total assets), type of management	Size (sales, profit margin, management type)	

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Lufti (1989) UK	Voluntary	Unlisted companies	Regression statistical technique	Agency theory, theory of the firm, informational risk theory	DI	Size, turnover, percentage of foreign turnover, gearing, share option scheme	Percentage of directors' equity, profitability, shareholders	Auditor firm, number of non-executive directors and substantial shareholders
Cooke (1989) Sweden;	Mandatory and voluntary	90 non-financial companies, 38 unlisted, 33 listed on SSE, 19 multiple listed (from top 2000 largest companies)	Unweighted index, step-wise regression analysis, Univariate and multivariate	Agency Theory, capital need, political costs, "bandwagon" effect	146 voluntary items, extent of disclosure of 146 voluntary items from prior studies, IASC, national standards, law and accountants	Multivariate: Size (total assets; turnover; number of shareholders), listing status, internationality Univariate: listing status; multiple listing	Industry trading	Multivariate: Parent company relationship in Sweden (number of subsidiaries)
Cooke (1991) Japan	Mandatory and voluntary	48 companies (13 unlisted, 25 listed on TSE, 10 multiple listing)	Multiple linear regression	Agency theory, political costs, capital need, "bandwagon" effect	106 voluntary	Size (total assets, turnover, number of shareholders), listing status, industry type (manufacturing)		Industry (trading, services, conglomerate)
Cooke (1992) Japan	Mandatory and voluntary	35 listed Japanese companies (21 manufacturing and 14 non-manufacturing)	Multiple linear regression	Agency theory, capital market theory	List of disclosure items developed from commercial code and securities and exchange law	Size, listing status, industry type		
Craswell and Taylor (1992)	Mandatory and voluntary	86 oil and gas companies		Reputation costs, signalling, agency costs	Dichotomous disclose oil and gas reserves 1, no disclosure 0	Audit firm		Leverage, size (assets), cash flow risk, ownership structure (top 20 shareholders)

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Cooke (1993) Japan	Mandatory and voluntary	48 listed and unlisted (from Japan Company Handbook)	Unweighted index, parametric t tests and Mann-Whitney non-parametric tests	Agency Theory, capital need hypothesis	Extent of disclosure of a list of 195 items developed from prior studies legal regulations	Listing status		
Lang and Lundholm (1993) USA	Mandatory and voluntary	2319 total company years of listed companies	Non-parametric, OLS regression using rank transformed data	Transaction cost hypothesis, legal cost hypothesis,	Disclosure list compiled by Financial Analysts Federation, analysts ratings, other publications	Size (market value)	Earnings/return	
Malone <i>et al.</i> (1993) USA	Mandatory and voluntary	125 Oil and gas companies (41 listed on NYSE or AMEX, 84 unlisted NASDAQ)	Weighted index by oil and gas financial analysts, step-wise regression model,	Stock exchange listing requirements, agency theory	129 weighted items	Listing status, ratio of debt to total equity, and number of shareholders	Audit firm size	Size (assets), profitability (rates of return, earnings margin), foreign operations diversification, proportion of outside directors
Hossain <i>et al.</i> (1994) Malaysia	Voluntary	67 Malaysia non-financial listed companies	Univariate and multivariate OLS regression		78 items	Size (market value), foreign listing status, domestic listing status	Ownership structure by top 10 shareholders, liquidity,	Gearing, proportion of assets in place and auditor firm

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Wallace <i>et al.</i> (1994) Spain	Mandatory and Voluntary	50 Non-financial companies (30 listed and 20 unlisted)	Weighted index, rank transformation of dependent and independent variables, ranked OLS regression	Signalling hypothesis, theory of association, political costs, information costs	List of 16 mandatory attributes	Size (total assets or total sales) and Listing status (listed on a stock exchange)	Operational performance (liquidity)	Auditor type, industry, gearing, earnings return and profit margin
Ng and Koh (1993)	Voluntary	106 listed companies		Agency theory, information costs, capital need, reputation, political costs, proprietary costs	3 statement of recommended practice	Size, profitability, gearing, auditor type	Industry (finance, properties, hotels)	Complexity of operation, liquidity
Hossain <i>et al.</i> (1995) New Zealand	Voluntary	55 listed non-financial companies (40 domestic and, 15 domestic and international)	Unweighted index, OLS model, and multivariate analysis	Agency theory, signaling theory	95 items, prior studies, accounting standards and practicing accountants	Size (total assets), foreign listing status and leverage		Assets in place, type of auditor
Meek <i>et al.</i> (1995) US, UK and Europe	Voluntary	116 US, 64 UK, 46 Europe	Unweighted index, regression analysis	Agency theory	List of 85 voluntary items, based on international analysts,	Size (sales), country/region, international listing, industry	Leverage	Profitability
Raffournier (1995) Switzerland	Mandatory and voluntary	161 industrial and commercial non-financial companies	Univariate and multivariate regression	Proprietary costs, political cost, information costs, foreign market pressures	30 items, requirements of the 4 th and 7 th EU Directives	Size (total assets and sales) and internationality (export sales)		Gearing; profitability; ownership; structure; auditor; size; fixed assets; industry type

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Wallace and Naser (1995) Hong Kong	Mandatory	80 non-financial listed industrial, conglomerates, property and utility companies	OLS regression (a) transformed independent and dependent variables (b) unranked data,	Political costs, proprietary costs, information costs, legitimacy (accountability)	30 Mandatory disclosure items (Cooke 1989b)	Size (total assets) and conglomerate	Profit margin and auditor firm	Earnings return, liquidity, leverage, sales, market value and outside ownership, registered office
Wallace and Naser (1995) Hong-Kong	Mandatory	80 listed Hong-Kong Stock Exchange companies	Rank OLS regression, data transformed, and Unranked OLS regression for comparison (Similar results ranked and unranked) Results based on ranked	Political costs and agency theory	Disclosure items mandated by Companies Ordinance, Stock Exchange and Society of Accountants	Ranked – assets Unranked – assets and scope	Ranked – profit margin and scope Unranked – profit margin and assets	Register, earnings return, liquidity, leverage, sales, market value and ownership
Gray <i>et al.</i> (1995) UK and USA	Voluntary	64 UK companies and 116 USA companies (50% listed, 50% unlisted)	ANOVA, Kolmogorov-Smirnov test for normality, raw scores used	Legitimacy theory,	128 voluntary disclosure items derived from analysts and prior studies	Size, degree of multinationality, Strategic and non-financial information, research and development information,	Industry	

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Ahmed (1996) Bangladesh	Mandatory and voluntary	59 non-financial listed companies	Transformed data and applied OLS regression	Reputation, political costs, parent company requirements, agency theory, capital need, signalling	150 items, 94 statutory, 56 voluntary	Listing status, subsidiary of multinational company and auditor firm size		Qualifications of the principal accounting officer, size (sales and assets), total debt
Inchausti (1997) Spain	Mandatory and voluntary	49, 47, 42 non financial listed companies (1989, 1990, 1991)	Step-wise regression,	Agency theory, political costs, proprietary costs	Information index of 50 information items, 20 voluntary from prior studies, 30 mandatory from newly established regulations	Size (assets),		Profitability, leverage, industry, dividend pay-out
Patton and Zelenka, (1997) Czech	Mandatory	50 Joint stock companies on the 1993 Prague Stock Exchange	Univariate and multivariate analysis,	Agency theory, signaling theory, capital need, image	66 items, Czech laws and regulations	Type of auditor, number of employees, stock exchange listing status, and return on equity performance		Total assets, percentage of IA, leverage, industry
Owusu-Ansah (1998) Zimbabwe	Mandatory	49 listed companies Zimbabwe Stock Exchange	Unweighted, multivariate analysis, linear regression model a) OLS regression b) Rank OLS regression c) Reduced variables	Proprietary costs, economic theory, transaction costs, agency costs, learning curve, political costs, signaling	DI of 214 mandatory items	Company size (market capitalisation), inside ownership, company age, multiple listing and profitability		Auditor type, industry-type and liquidity

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Adams and Hossain (1998)	Voluntary	34 life insurance companies (193 annual reports, 84 mutuals and 109 stocks)		Agency theory	189 items	Organisational form (stock companies), size (MV of assets), proportion of non-executive directors, reinsurance	Product concentration, distribution systems	Assets in place, localization of operations
Chen and Jaggi (2000) Hong Kong	Mandatory	87 largest listed companies exc. utilities, finance and non-depository credit institutions		Agency theory	30 weighted mandatory items	Proportion of independent directors (stronger for non-family owned), size (assets)	Profitability (ROE), Conglomerate	Sales, Market capitalisation, liquidity, gearing, outside ownership, audit firm, year end
Depoers (2000) France	Voluntary	102 industrial and commercial non-financial listed companies	Univariate and multivariate analysis, methodology (Cooke 1989)	Information costs, foreign market pressure, political and proprietary costs	65 voluntary disclosure items	Firm size (turnover), foreign activity, barriers to imitation	Labour pressure	Leverage, auditor size, ownership structure
Ho and Wong (2001) Hong Kong	Voluntary	98 listed companies		Agency theory, capital need,	20 items	Existence of audit committee, size (assets), industry (manufacturing)	Proportion of family members on the board of directors,	Independent directors, dominant personality, leverage, assets-in-place, profitability, industry (conglomerate, banking, finance)

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Camfferman and Cooke (2002) UK and Netherlands	Mandatory and voluntary	1996, 161 UK and 161 Dutch corporations	Pair-wise match, transformation, Cook (1998)	Political costs, information costs, capital need, agency theory, signaling, reputation costs	DI, 93 items of disclosure from the 4 th and 7 th EU Directives	UK: Industry (manufacturing, industry (conglomerate), size (assets), audit firm Netherlands: Industry trading Size(assets), gearing, current ratio, industry conglomerate	UK: profitability (net income margin) Netherlands: Industry trading	UK: current ratio, return on equity, gearing, industry (trading and services) Netherlands: industry manufacturing and services), profitability (net income margin and return on equity), audit firm
Haniffa and Cooke (2002) Malaysia	Voluntary	138 non-financial listed companies		Agency theory, capital need, signaling theory, political costs, information costs, legitimacy, Islamic business ethics,	65 items	Assets-in-place, ownership by 10 largest shareholders, foreign investors, profitability (ROE), proportion of Malay directors on the board, size (assets), diversification	Industry (consumer and industrial), independent chair, proportion of family members on the board	Prop. of independent directors, role duality, cross directorships, chair with cross- directorships, Malay FD, chair, Malay MD, FD qualifications, gearing, business complexity, institutional investors, industry (trading, plantation, mining), multiple listing, audit firm, listing age, foreign activities

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

<u>Author (Year) Country</u>	<u>Focus</u>	<u>Sample Size</u>	<u>Methodology</u>	<u>Theoretical aspects</u>	<u>Dependent variable</u>	<u>Positive significant variables confirmed</u>	<u>Negative significant variables confirmed</u>	<u>Insignificant variables not confirmed</u>
Naser <i>et al.</i> (2002) Jordan	Mandatory and voluntary	84 manufacturing and services listed companies		Proprietary costs, capital need, reputation, legitimacy, agency and signaling theory	104 items	Size (market capitalisation, sales), audit firm, gearing, profitability (profit margin)	Liquidity	Assets, ROE, number of shareholders, government ownership, individual ownership, foreign ownership, Arab ownership, industry, employees
Eng and Mak (2003) Singapore	Voluntary	158 listed companies		Agency theory	46 weighted items	Government ownership, size (sum of MV of ordinary share, BV of debt and BV of preference shares)	Managerial ownership, proportion of outside directors, leverage	Block ownership, growth, industry, audit firm, analyst following, stock return, profitability (ROE and ROA)
Prencipe (2004) Italy	Voluntary	64 Italian listed companies,	Weighted and unweighted index, multivariate least squares regression	Proprietary costs, signaling and agency theory	Extent of segment disclosure, mostly voluntary attributes adopted from the 4 th and 7 th EU Directives	Listing status and age	Growth rate	
Alsaeed (2005), Saudi Arabia	General voluntary	40 (Manufacturing, cement, service, electricity, communications and agriculture)	Unweighted index, Unranked ordinary least squares in Camfferman and Cooke (2002)	Agency theory	Level of disclosure on a list of financial items generated from prior studies Meek <i>et al.</i> (1995), Botosan (1997), and Naser and Nuseibeh (2003)	Size – book value of total assets	Firm age	Gearing, ownership dispersion, profit margin, return on equity, liquidity, industry type and audit firm size

Appendix 1A: Summary of Mandatory and Voluntary Empirical Studies (cont)

Barako et al. (2006), Kenya	Voluntary (1992-2001)	54 (Agriculture, commercial, finance and industrial)	Weighted and unweighted index	Agency theory	Financial and non-financial information	Audit committee, proportion of foreign ownership, percentage of institutional ownership, size, leverage	Board composition, shareholder concentration	Board leadership, audit firm, profitability, liquidity
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Appendix 2A: Level 6 Industrial Classification

Level 1	Market data	
Level 2	Non-financials	Non-financials excluding resources
		Resources
		Financials
Level 3	Resources	Basic industries
		Cyclical consumer products
		Non-cyclical consumer products
		Cyclical services
		Non-cyclical services
		Utilities
		Information technology (IT)
		Financials
Level 4		Comprising 39 sectors based on FTSE Actuaries system
Level 5		Comprising 11 sub-sectors based on FTSE Actuaries system
Level 6		Devised by <i>DataStream</i> where more detailed descriptions than those provided in level 4 and 5.

Source: *DataStream* (2005)

Appendix 2B: 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	<u>34</u>
			62
2410	Chemical	Chemicals	12
2463		Personal care and h'hold prods	5
5212		Household goods and textiles	<u>14</u>
			31
2840	Engineering	Steel and other	2
2710		Engineering and machinery	24
3430		Automobiles and parts	10
3530		Aerospace and Defence	<u>7</u>
			43
3002	Electrical	Info Tech Hardware	17
3210		Electronic and electrical equip't	16
4013		Electricity	3
4100		Utilities (Ex-electricity)	8
5147		Diversified industries	<u>6</u>
			50
2441	Pharmaceutical	Pharmaceuticals and biotech	<u>14</u>
			14
5211	Retailers	General retailers	35
5211		Food and drug retailers	<u>6</u>
			41
7222	Computer	Software and computer services	31
7412		Support services	59
7420		Telecommunication services	12
7440		Media and entertainment	<u>39</u>
			141
6340	Services	Transport	22
8511		Health	14
9210		Leisure and hotels	<u>25</u>
			<u>61</u>
			<u>443</u>

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;

Appendix 2C: Directors' Shareholding and Dummy Variables

Shareholding	Minimum		Dummy variables		Maximum
3%	0.00	<	DS1	≤	0.029
5%	0.029	<	DS2	≤	0.048
10%	0.048	<	DS3	≤	0.096
30%	0.096	<	DS4	≤	0.292
50%	0.292	<	DS5	≤	0.490
50% +	0.490	<	DS6	≤	

Source: Annual Reports

DS1: dichotomous variable that scores "1" for directors' shareholding greater than zero and equal to or less than 2.9% and "0" otherwise;

DS2: dichotomous variable that scores "1" for directors' shareholding greater than 2.9% and equal to or less than 4.8% and "0" otherwise;

DS3: dichotomous variable that scores "1" for directors' shareholding greater than 4.8% and equal to or less than 9.6% and "0" otherwise;

DS4: dichotomous variable that scores "1" for directors' shareholding greater than 9.6% and equal to or less than 29.2% and "0" otherwise;

DS5: dichotomous variable that scores "1" for directors' shareholding greater than 29.2% and equal to or less than 49% and "0" otherwise;

DS6: dichotomous variable that scores "1" for directors' shareholding greater than 49%.

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