Received 1 September 2014
Revised 28 October 2015
Accepted 11 March 2016

# Board governance, intellectual capital and firm performance

## Importance of multiplicative effects

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### Abstract

**Purpose** – The purpose of this paper is to examine the relationship between the combined (multiplicative) effect of board governance and intellectual capital (IC) on firm performance.

**Design/methodology/approach** – This study is cross-sectional and follows a positivist view of testing pre-specified hypotheses. The study uses a respondent sample of 128 service firms operating in Kampala, directors or managers are the unit of enquiry. Structural equation modelling with analysis of moment structures is used for statistical modelling.

**Findings** – Board governance and IC make significant contributions to firm performance. However, their interaction is a significant booster to services sector firms' performance in Uganda.

**Research limitations/implications** – Although an attempt is made at controlling for common method variance in particular by proactive instrument design and testing, and usage of the Harman single factor analytical technique, its influence may not have been dealt away completely owing to failure to obtain a plausible common marker variable. Well, it is meaningful to identify the significant positive multiplicative effects of board governance and IC so as uncover what is needed in service firms to improve their performance.

**Originality/value** – Studies explaining firm performance via board governance only and which ignored the synergistic effects of board governance and IC have often missed the reality that the performance of the firm can significantly be improved by means of leveraging IC while simultaneously calling for effective board governance.

**Keywords** Uganda, Firm performance, Intellectual capital, Board governance, Multiplicative

**Paper type** Research paper

### Introduction

For a long time now, firm performance has been a focus of academic research especially with the "meltdowns" of significant companies in the USA and UK and the late 1990s banking crisis in Asia. Demirbas and Yukhanaev (2011) find that among the factors that affect performance of Russian firms is the performance of the board. Similarly, consistent reports of poor performance and failure of Ugandan companies are also not uncommon (Brownbridge, 1998; Habyarimana, 2003; Among, 2009; Kasita and Emojong, 2010; Tentena, 2010). The Ugandan case of poorly performing firms is epitomised by the findings of the Ogoola commission report (Government of Uganda, 2000) indicating that all Ugandan failed banks had at no time a team of well trained, experienced and proven commercial bank managers and strong willed board of directors that knew what it was doing besides a poorly thought out system of internal controls like internal audit. Available literature indicates that effective board governance can be significant for firms in developing countries because it can lead to better firm performance (Okpara, 2011). Similarly, research (Riahi-Belkaoui, 2003; Chen *et al.*, 2005; Cleary, 2009) finds support for significant relationships between the human capital, relational capital and structural capital dimensions of intellectual

Journal of Economic and Administrative Sciences
Vol. 32 No. 1, 2016
pp. 20-45

1026-4116
DOI 10.1108/JEAS-09-2014-0020

capital (IC) and firm performance. As IC is critical to firms' success (Huang and Liu, 2005) it, along with effective board governance, can better explain variances in firm financial performance. Two assumptions are suggested here to support this conjecture.

First, the changing global economy, consisting of complex, dynamic and competitive environment calls for the modern approach to profitability improvement by managing IC (Ghosh and Mondal, 2009) than just the traditional way of monitoring operations (Ting and Lean, 2009) by the board. This suggests that a balance can be attained between effective board governance and IC in a multiplicative fashion in order for service firms to enhance financial performance. This approach to firm performance can develop "IC theory in practice and effective IC management through praxis" (Dumay and Garanina, 2013, p. 21). Besides, Brennan and Kirwan (2015) report that "research on boards has found that over-emphasis on agency theory's monitoring role negatively impacts board effectiveness" (p. 1). Therefore, the interaction between board governance and firm's IC can be a genuine orientation towards supporting improvements in, for example, organisational management systems than the monitoring endeavours of the board that do not substantively engage the organisations' IC.

Second, it is possible to apply the resource-dependency theory of board governance and the resource-based view of the view of the firm in providing a relevant framework for understanding variances in firm performance. For example, the resource-dependency theory of corporate governance focuses on the importance of the board of directors in improving the firms' performance (Hillman *et al.*, 2000). This theory suggests that the board is critical to firms in providing or securing essential resources (Arnegger *et al.*, 2014; Liu *et al.*, 2014) in two ways: first, through directors' diverse knowledge and expertise (which help to improve the performance of the firm) and second, through their extensive links with the outside world (which give the organisation access to external resources, including suppliers, buyers, public-policymakers, social groups and legitimacy). Similarly, resource-based theory suggests that IC, as a bundle of knowledge assets, represents an essential resource that best enhances and supports firm performance improvement (Marr and Schiuma, 2001; Carlucci and Schiuma, 2007). As directors are seen as useful resources (Afrifa and Tauringana, 2015) and firms' IC is also a useful resource, the combinatory role of board governance and IC should better explain variances in firm financial performance. This is likely to be true because it has been argued (Safieddine *et al.*, 2009) that the profit-making potential of firms depends on their capacity to properly use all resources at their disposal.

The aim of this paper is to report the results of examining the relationship between the combined effect of board governance and IC with firm performance using a sample of 128 service firms operating in Kampala whose directors or managers are the unit of enquiry. Service firms form the setting because Uganda's services sector remains the sector with the highest demonstrated potential (Nkundabanyanga *et al.*, 2013) and stakeholders need better ways of ensuring that the sector's firms continue to register impressive results. The design of this study allows for the consideration of more than simply the main effects of IC and board governance by including the multiplicative effects. This is significant as a more accurate and more detailed description of the relationships, increased explanatory power and potential for significant results (Friedrich, 1982) is ensured. This study shows that the predictive power of the main effects (board governance and intellectual on firm performance) accounts for 25 per cent of the variance and including the interaction term with the main effects

accounts for 40 per cent of the variance. This therefore suggests that considering main effects alone results in models being under-specified especially those involving at least two predictor variables (Friedrich, 1982). Thus the interactive model explains about 15 per cent more of the variation in firm performance than does the additive model. This study also addresses the anomaly apparent in those studies employing additive variables (board governance and IC) of treating the coefficients as constants irrespective of the level of the other independent variable. Such studies ignore that "the coefficients in the interactive model describe the effects of each independent variable as varying, according to the level of the other independent variable" (Friedrich, 1982, p. 804).

The rest of the paper is organised as follows: the next section is informing literature. This section depicts the theoretical background to investigate the interaction of board governance and IC on firm performance. In this section also, the hypotheses to be tested are developed and stated. This section is then followed by the methodology used in the study to generate the current results. This section specifies the design and methods used in data management including reliability and validity and statistical modelling. The penultimate section is results and discussion and finally concluding remarks.

## Literature review

### *Theoretical background*

In this study, the multiplicative effect of board governance and IC on firm performance is investigated through agency theory (Alchian and Demsetz, 1972; Jensen and Meckling, 1976), resource-based view (Barney, 1991; Wernerfelt, 1984) and resource-dependency theory (Pfeffer, 1972; Pfeffer and Salancik, 1978). Agency theory suggests that employees or managers in organisations can be self-interested. Accordingly, board governance is crucial for firm financial performance because the board of directors can act as an efficient internal mechanism for controlling the presumed egocentricity of managers or employees in the absence of external governance mechanisms in developing markets (Kumar and Singh, 2012) like Uganda. One the other hand, resource-based view suggests that variances in firm performance are primarily the result of IC heterogeneity across firms (Wernerfelt, 1984) and this makes IC a strategic asset because of the likely link between IC and firm performance (Riahi-Belkaoui, 2003). Yet also, one important board function is the provision of resources (Hillman and Dalziel, 2003) – a perspective dominant in the resource dependence theory (see, Pfeffer, 1972; Pfeffer and Salancik, 1978). This perspective refers directly to board's ability to bring resources to the firm, which are "anything that could be thought of as a strength or weakness of a given firm" (Wernerfelt, 1984, p. 172). The resource dependence logic thus suggests that a board's provision of resources is directly related to firm performance (Hillman and Dalziel, 2003). Therefore integrating resource dependency with the resource-based view of the firm (Barney, 1991) may be productive due to their complementary focus on resources. Integrating these two theories brings in two organisational resource endowments perspectives: IC of the board and firms' IC – that residing in the firms themselves. Hillman *et al.* (2009) suggest that it may also explain how organisations obtain competitive advantage by obtaining valuable, rare, non-substitutable and imitable resources from the external environment thereby allowing for the consideration of both an internally focused perspective of how organisations specify resource needs and an externally focused perspective of how organisations obtain these valuable resources. From the agency theory and resource-dependency perspective insight can be offered

into how obtaining control of critical resources offers better firms' performance and how developing resource interdependencies around critical resources affect the firms' performance derived from them.

This study therefore applies the agency, resource-based and resource-dependency theories to explain firm financial performance. While the governance prescription of agency is to design controls that enforce compliance (Knapp *et al.*, 2011), the ability of organisations to cope, survive, grow, and otherwise attain and maintain business successes is related to their abilities to use various "capitals" in order to create and leverage value, and to accomplish their visions especially financial goals (Keenan and Aggestam, 2001). Arguably, then, the combinatory effect of board governance and IC should deliver acceptable firm financial performance. For the examination of this practice in predicting firm financial performance this study invokes agency theory, resource-based view and resource-based view. This is consistent with the recommendation made by Abdullah and Valentine (2009). These authors recommend a multi-theoretic approach for studies of this nature.

*Board governance and perceived firm performance*

The epistemology of the board governance concept shows that it is derived from governance. Board of directors provide direction to those who manage a company (Beaver *et al.*, 2007). As such, I define board governance as process factors, essentially qualitative in nature, employed to provide direction of the firm by the board. These process factors of the board include controlling and organisation of their meetings, the activities of the board and making communication effective (Nkundabanyanga *et al.*, 2013). Such process factors, as the study by Cornforth (2001) indicates, explain the variance in effective board governance. The expectation is that effective board governance contributes significantly to firm performance. For example, Vafeas (1999) find that increased frequency of meetings is important for firm performance improvement. Similarly, effective board governance has been noted to be significant for firms in developing countries because it can lead to increased firm performance (Okpara, 2011). According to Larcker *et al.* (2007), it is now unimaginable to think of corporate boards as irrelevant for understanding organisational outcomes and according to Nkundabanyanga *et al.* (2015) their workings (board governance) have received increasing attention in the literature. The study by Green and Griesinger (1996) which develops a model and programme logic for their study of not-for-profit developmental disability workshops and residential facilities in the USA suggests a correlation between the effective board governance and firm performance. Whereas Okpara's (2011) study is only conceptual and while Green and Griesinger's (1996) results are from a small sub-sector of not-for-profit organisations in the USA, they do confirm an impression from other literature and anecdotal experience that there is some expectation of a relationship between effective board governance and firm performance.

About two assumptions can support the idea that effective board governance positively influences firm financial performance. First, according to Mishra and Mohanty (2014), investors prefer to deal with companies with better governance practices. For example, a firm with good board governance can raise funds for investment at a lower cost (Agrawal *et al.*, 1996; *Business Week*, 2000) thereby strengthening its financial performance (Mishra and Mohanty, 2014). Second, board role performance ensures that firms are run in a responsible and

accountable manner, enhancing the overall performance (Dalwai *et al.*, 2015). Therefore board governance continuously reviews mechanisms to influence the self-interested managers for aligning with the shareholder interests. It is to be expected that only effective board governance can do this. The foregoing discussion leads to the following hypothesis:

*H1.* Board governance positively and significantly influences firm performance.

*IC and firm performance*

By and large, IC literature defines IC as an aggregate expression of the intangible assets possessed by the organisation. Sometimes these assets are classed as employee (individual) competence, internal structure and external structure (Sveiby, 1997). For Edvinsson and Malone (1997) they are termed as human capital, organisational capital and customer capital, respectively. Pablos (2003) terms "customer capital" as "relational capital". To Riahi-Belkaoui (2003), it is a mix of human capital, structural capital and customer capital. Despite the proliferation of the IC taxonomies, on a theoretical stance, proponents argue that IC is the value driver leading to greater profitability (Bismuth and Tojo, 2008).

A number of studies support the hypothesis that IC significantly and positively influences firm financial performance. Chen *et al.* (2004) establish a significant relationship between IC elements and firm performance. Kamukama *et al.* (2010) find positive relationships between the interaction of IC elements and financial performance in Ugandan microfinance firms. For the information technology industry in Taiwan, Wang and Chang (2005) find that in general IC elements directly affect business performance.

The above inferences can be further accentuated. In the first place, the profit-making potential of firms depends on their capacity to properly use all resources at their disposal – financial, physical and IC (Safieddine *et al.*, 2009). IC being an essential strategic asset that refers to the specific and valuable knowledge lying in an organisation (Nonaka and Takeuchi, 1995; Teles, 2004) is vitally important in creating and sustaining the growth of firms (Safieddine *et al.*, 2009). Second, the importance of IC is typified by the enormous research interest transcending two stages and now in third stage over just two decades. The first stage helped to develop IC framework, the second stage developed approaches to measuring, managing and reporting IC and to gather evidence in support of its further development. The emerging third stage characterises research critically examining its practice and managerial implications of how to use it in managing a company (Dumay and Garanina, 2013). Clearly there is every reason to expect a significant and positive relationship between IC and firm financial performance. The following hypothesis will be stated:

*H2.* IC positively and significantly influences firm financial performance.

*Interaction of board governance and IC to cause firm performance*

Board governance sets the rules for the relationship between management, employees and the activities for creating and sharing value – presenting guidelines for proper resource allocation and management (Safieddine *et al.*, 2009). Resources within the control of the firm include assets, capabilities, organisational processes, firm attributes, information and knowledge (Ting *et al.* 2010) and can yield sustainable competitive advantage when valuable, rare, inimitable and non-substitutable

(Barney, 1991). These valuable, rare, inimitable and non-substitutable assets have come to be known as IC. Ruzevicius (2006) observed in the European Foundation for Quality Management (EFQM) model of excellence that leadership is linked with IC components. In the context of this study, this linkage is argued to be the complementary role that board governance and IC ply in influencing firm financial performance. This is because other than only acquiring human capital, firm's board governance adopts and incorporates structures and processes to deploy, protect and retain (Keenan and Aggestam, 2001; Bontis, 1996). As IC "allows an organisation to transfer a collection of material, financial and human resources into a system capable of creating value for the stakeholders" (European Commission, 2006, p. 4), this means that IC is found in all organisations. It follows that since "A board is a team of knowledge workers, and to do its job, the board needs the same resources and capabilities that any other successful team of knowledge workers needs" (Conger *et al.*, 1998, p. 140), IC and board governance have to interlock for better financial performance of organisations.

A number of assumptions suggest that IC and board governance indeed need to interlock and in a multiplicative fashion to improve firm performance. First, board governance is easily discernible in meetings and meetings frequency is important for firm performance improvement (Vafeas, 1999). Such meetings might be impossible if some IC elements are not present at the same time. For example administrative systems such as a vibrant information system that would produce say accounts for the directors to deliberate on or databases and other management information systems necessary for producing decision-useful information for the directors in the meetings should exist. Second, board of directors are likely to provide advice to top management, but also managers endowed with a high level of human capital can be consulted in formulation of firm policies (Zappalà and Cronin, 2003). If this collaborative relationship is well entrenched in firms, it can be expected that better financial results ensue in service firms given that better customers' satisfaction (high quality service) derives from high-level human capital ((Zappalà and Cronin, 2003). Third, research into IC has evolved into the third stage which, according to Guthrie *et al.* (2012) is characterised by research critically examining IC in practice and devoted to the managerial implications of how to use intellectual in managing a company. Therefore, as the position of this paper suggests, practical board governance should view IC as complimentary to itself (board governance) in the pursuit of better financial performance. As Guthrie *et al.* (2012) outline another essential aspect of the third stage as empirically researching IC practices inside organisations; this paper argues that this practice should be the combinatory role performance of IC and board governance. Lastly, resource dependence theory suggests that larger boards with high levels of links to the external environment improve the company's access to various resources, which in turn positively influence corporate performance (Sheikh *et al.*, 2013). Van den Berghe and Levrau (2004) argued that increasing the number of directors provides an increased pool of expertise because large boards are likely to have more knowledge and skills than small boards. However, Jensen (1993) states that when boards get larger, they are less likely to function effectively. It can then be assumed that resource-based view and resource-dependency theory complement each other to provide an unambiguous significant positive relationship between the interaction of board governance and IC on one hand and firm performance on the other. This is because; the internal IC resources of the firm will compliment the resources of a smaller board particularly those of service firms. It is difficult to see how either board

governance or IC on their own, can better positively influence firm performance than their combinatory effect. Therefore:

*H3.* The interaction (multiplication) of IC and board governance explains more of the variance in overall firm financial performance than the direct influence of IC or board governance on their own.

## Methodology

### *Design, population, sample and questionnaire*

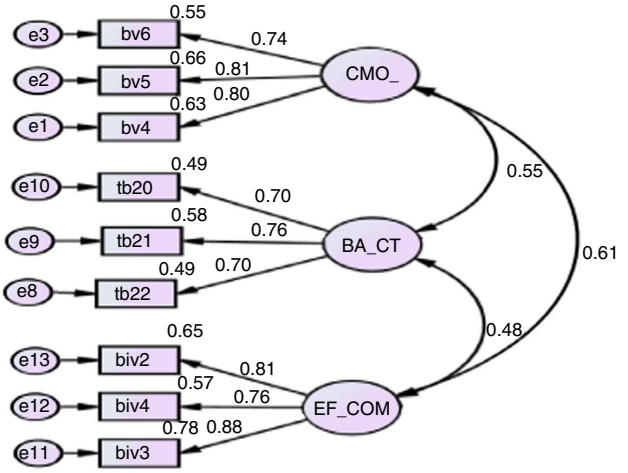
This is a cross-sectional study conducted in December 2012, correlational and utilises 128 responses from a sample of 377 service firms generated using Yamane's (1973) sample selection approach in a population of 6,534 formal service firms in Kampala region according to Uganda Bureau of Statistics – Uganda Business Register 2006/2007. Given the objectives, I consider the recording of the response in the questionnaire design (Sudman and Bradburn, 1982; Sekaran, 2000). There are two ways in which this can be done. One approach is to use an open-answer format which allows and encourages respondents to give their opinion fully and with as much nuance as they are capable (Sudman and Bradburn, 1982). However, this approach appears inapplicable in this research where the intention is to calculate the mean ratings of the extent of agreement with each statement; in the alternative I consider a closed-answer format which is easier to analyse, particularly in the statistical sense (Sudman and Bradburn, 1982). I use a self-administered questionnaire with anchors on five-point Likert (1961) scale, which allows the respondent to register the degree of agreement ranging from 1 (strongly disagree) to 5 (strongly agree). After a number of call backs (minimum of two) responses from males are 97 and the females are 31. About 60 per cent of the respondents have postgraduate education and more than half of the respondents are above 36 years of age which corroborates the qualification that would normally have been acquired in Uganda by such an age bracket. Out of 128 respondents, 93 were managers (or about 73 per cent) and 35 were directors (or about 27 per cent). This indicates a known difficulty in obtaining directors to answer questionnaires (Nkundabanyanga *et al.*, 2013). Furthermore, out of 128 respondent firms (or about 34 per cent. response rate), trade and other business services were 64, hotels and restaurants were 17, transport storage, posts and telecommunications were 21 and financial services were 26.

### *Measurement of variables, validity, reliability and data management*

I develop item scales for board governance consistent with the Institute of Corporate Governance of Uganda's (2001) manual on corporate governance, The Companies Act (1961) Cap.110, Laws of Uganda, the works of Cornforth (2001), Petrovic (2008) and practitioners like Jacobs *et al.* (2007). Questions are anchored on a five-point Likert scale designed to measure the opinion of a respondent (Burns and Grove, 2009), to obtain self-reported information on board governance. A content validity index (CVI) of greater than 0.7 was obtained for all the constructs studied and all matters raised by the experts were addressed in the final instrument. Cronbach's $\alpha$ statistic (Cronbach, 1951) is often used as an indicator of the reliability of a questionnaire, demonstrating that subjects show the same response pattern over the duration of the questionnaire and $\alpha$ indicates the extent of correlations between items (Gorrell *et al.*, 2011) which should be above 0.7 (Kim, 2007). The results are: Pilot CVI (board governance = 0.812,

IC = 0.827 and perceived performance = 0.912); Pilot Cronbach's $\alpha$ (board governance = 0.855, IC = 0.968 and perceived performance = 0.884); main (final) study Cronbach's $\alpha$ (board governance = 0.895, IC = 0.940 and perceived performance = 0.866). Principal component analysis (PCA) is performed to identify patterns in data and to reduce data to a manageable level and achieve parsimony and hence explain the maximum amount of common variance using the smallest number of explanatory constructs (Field, 2009). The resulting four components explain 66.77 per cent of the variance in board governance. Confirmatory factor analysis (CFA) finally retains control and meetings organisation, effective communication and board activity in an effective board governance model described in Figure 1 and nine items scales, others dropped, at this stage, because of measurement variance.

I utilise the measurements developed by Indra (2007) and Subbarao and Zeghal (1997) and define an IC item as an IC attribute. The existence of one or more attributes gives rise to an IC sub-category. The IC items in the human capital category are




**Notes:** COM_, control and meetings' organisation; BA_CT, board activity; EF_COM, effective communication; bv4, there is good time-management for meetings; bv5, there is clear dialogue and communication; bv6, voting results in full commitment of all decisions; bv3, board papers are delivered to members in advance; biv4, notices of board meetings are sent in advance; biv2, our board makes clear minutes; tb21, our board is rigorous in delegating operational management to the executive group; tb22, our board builds stronger controls and processes that ensure that power supports the needs of the company and not the ambitions of individuals; tb20, our board makes greater use of a management committee, chaired by the chief executive directors and key managers and the deliberations are reported to board in full. $\chi^2 = 24.197$, df = 24, $p = 0.450$, GFI = 0.958, AGFI = 0.922, RMR = 0.010, TLI = 0.999, CFI = 1.000, NFI = 0.952, RMSEA = 0.008. Board governance model for Uganda's Service Sector Firms

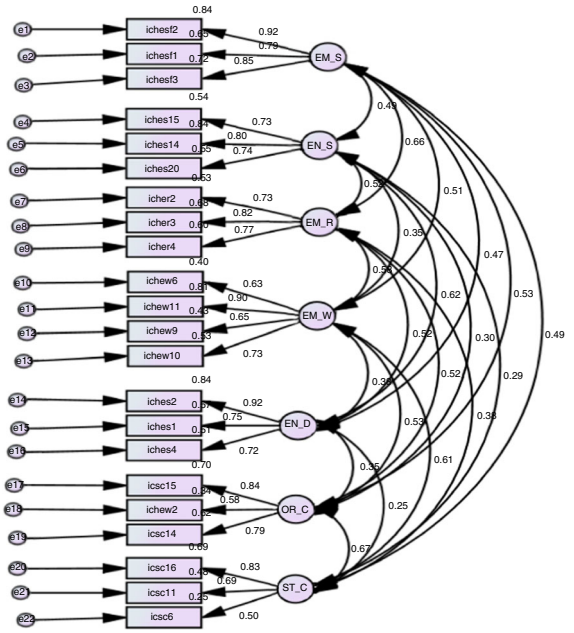
**Figure 1.**
Board governance measurement model

clustered into seven sub-categories: training and development, entrepreneurial skills, equity issues, employee safety, employee relations, employee welfare, employee-related measurements. Roos *et al.* (2005), document what is perceived to contribute to organisational capital/structural in firms which include: documented systems, documented processes, patents, brands, mastheads, access rights, management contracts, employee contracts, employee development and training programs, performance management systems, customer lists, customer contracts, supplier contracts, formal alliances and organisational culture. I utilise these measures in addition to relational capital measures of reputation, strategic alliances, customers, suppliers and connection to other agents (Eduardo *et al.*, 2004). Performing a PCA results in seven components and explains 67.75 per cent of the variance in IC. CFA retains all the seven components in a model of IC described in Figure 2 and 22 items scales, others dropped due to measurement variance.

The financial performance measures commonly used by empirical researchers and financial analysts include AROA, ROA, ROI (Wang and Chang, 2005; Ghosh and Mondal, 2009; Aluchna, 2009; Hang, 2009). However, the financial information provision culture in Uganda is far from desirable yet; analysis of moment structures (AMOS) is not responsive to data sets with missing data. And because I use SEM with AMOS, I control for high non-response rates, and questions that capture perceived financial performance are used. I explain 55.67 per cent of the variance in perceived firm financial performance by performing a PCA using seven questions, others dropped, due to measurement variance.

In the PCA with all component loadings $< 0.50$ suppressed and a cut-off eigenvalue is 1, I ensure that factor analysis yields distinct and reliable factors by use of Keiser-Meyer-Olkin (KMO) and Bartlett's test of sampling adequacy. The Bartlett sphericity test $\chi^2$ $(171) = 1160.814$, $p < 0.001$ indicates that correlations matrix for board governance is significantly different from the identity matrix in which the variables would not correlate with each other, the variables being appropriate for factorisation; its KMO index $= 0.827$ characterises the set of variables as being very good for factorial analysis. Since the determinant is greater than 0.00001 (in this case 6.21E-005) it results that there is no multicollinearity or singularity between variables (Kulcsár, 2010). IC shows the Bartlett Sphericity test $\chi^2$ $(630) = 2745.619$, $p < 0.001$, KMO index $= 0.857$ and determinant $= 3.59$E-011). Similarly, Perceived firm financial performance shows the Bartlett sphericity test $\chi^2$ $(21) = 379.660$, $p < 0.001$, KMO index $= 0.853$ and the determinant is greater than 0.00001 (in this case 0.047).

I follow recommendations by Field (2009) regarding missing values. As this study employs a questionnaire to solicit for information yet; common methods variance (CMV) affects questionnaire-based studies in social sciences (Gorrell *et al.*, 2011). I employ several methods to control for this. First, multiple scales are used for cognitive independent constructs. Second, the respondent's anonymity is protected so that their responses are more aligned to the research goal. Besides the respondents are expressly assured that there are no right or wrong answers as long as the responses are honest. This is calculated to reduce the respondent's apprehension over their responses hence reducing the chance that they can edit their answers to give what they perceive as the best answers. Second, I limit reverse scoring, avoid "double-barrelled" questions and scale anchors are not changed so as to reduce the risk of reducing scale reliability. Third, as already mentioned I select board of directors and top management (managers) ensuring experienced/knowledgeable respondents to properly address the measures.




**Notes:** ichesf3, potential risks to employees are identified and dealt with during the employee safety plans; ichesf1, managers in this organisation ensure correct health and safety plan implementation; ichesf2, managers in this organisation ensure compliance using employee safety plans; iches20, people in this organisation have high need for achievement; iches14, people in this organisation co-operate with other experts such as marketing, R&D, external suppliers, service providers, customers; iches15, people in this organisation communicate across technical boundaries as innovations often start at borders rather than within a set area of expertise; icher4, in this organisation employees are featured when they make spectacular contributions to the organisation; icher3, In this organisation employees are encouraged to succeed in life; icher2, in this organisation, employees get thanked for better performance; ichew10, in this organisation, there is always an upward review of salaries and welfare packages at intervals; ichew9, this organisation has staff canteens or lunch subsidy; staff buses; children scholarships; car loans, housing allowances and wardrobe allowances; ichew11, this organisation instigates comprehensive employee welfare; Ichew6, this organisation encourages socialisation events, ceremonies, and corporate events such as the family day and foundation day; iches4, the staff in company persist in new ideas and creative thought; iches1, this organisation enables the skills development of intrapreneurs; iches2, this organisation establishes frameworks to encourage intrapreneurial processes; icsc14, we have well established manuals which are owned by the organisation and are reproduced and shared; ichew2, this company offers appropriate maternity leave benefits; icsc15, we have well established administrative systems which are owned by the organisation and are reproduced and shared; icsc6, this organisation encourages supplier contracts; icsc11, the organisation's investment in databases and management information systems is appropriate; icsc16, the technology we use here is up-to-date. Em_S, employee safety; EN_S, entrepreneurial skills; EM_R, employee recognition; EM_W, employee welfare; EN_D, entrepreneurial development; OR_C, organisational capital; ST_C, structural capital. $\chi^2$=258.992, df=188, $p$=0.000, GFI=0.851, AGFI=0.799, RMR=0.012, TLI=0.934, CFI=0.946, NFI=0.832, RMSEA=0.055. CFA for Intellectual Capital

**Figure 2.**
Intellectual capital measurement model

Fourth, I pre-test the survey instrument by a representative group of respondents (academics and consultants) in order also to support the instrument's content validity. Lastly I perform a PCA and find many factors emerging for each construct and according to Podsakoff and Organ (1986) giving an indication that any remaining CMV in the data does invalidate the results.

Going ahead, I test for assumptions of normality, linearity of data and homogeneity of variance to explore the data and determine its distribution as Tabachnick and Fidell (2007) suggest that normality of variables enhances the solution and because the numbers of factors are determined using statistical inference, multivariate normality is assumed. I assess normality by skewness and kurtosis (Tabachnick and Fidell, 2007). According to Field (2009), the values of kurtosis and skewness should be zero in a normal distribution. I find that following this rule, the data are fairly normally distributed. I test for the assumption of homogeneity of variance using the Levene's test and this test returns a non-significant value making the homogeneity of variance tenable for the data.

*Statistical modelling*

I estimate the model of effective board governance, IC and firm performance in line with my objective by employing structural equations modelling (SEM) because SEM addresses the issue of measurement error, and simultaneously estimates a system of structural equations. The overall fit of models is tested using $\chi^2$ which requires that the model is rejected if the $p$-value is $< 0.05$; root mean square error of approximation (RMSEA) should be $< 0.06$ and Tucker-Lewis index (TLI) values of 0.95 or higher (Hu and Bentler, 1999). Kim (2007) and Yang (2006) recommend goodness-of-fit (GFI) $> 0.90$, Adjusted goodness-of-fit index (AGFI) $> 0.85$, TLI $> 0.95$, CFI $> 0.90$, as acceptable goodness-of-fit indices. I also utilise the critical ratio (CR) for statistical significance of parameter estimates. Since the respondent sample is less than 200 (128, in fact), I utilise Bayesian estimation as posterior distributions over parameters of a SEM can be approximated to arbitrary precision with AMOS, even for smaller samples (Senthilkumar and Arulraj, 2011). For model plausibilty and comparison, I again use Morgan and Hunt (1994), Gelman *et al.* (2004) and Lee (2007) criteria.

## Results and discussion

*Results*

Means and standard deviations are generated so as to summarise the observed data because according to Field (2009), means represent a summary of the data and standard deviations show how well the means represent the data. The main purpose is to establish whether the statistical means are a good fit of the observed data (Field, 2009). The means, standard errors, standard deviations and variances of all the dimensional constructs are summarised in Table I.

Table I reveals that all mean scores of the constructs in question range between 3.4160 and 4.0052 on a five-point Likert scale, with the standard deviations in the range of 0.72178-0.93398. These figures reveal small standard deviations compared to the mean. According to Field (2009), small standard deviations (relative to the value of the mean itself) indicate that the data points are close to the means and thus a fair reproduction of reality. The standard error which is a measure of how representative a sample is likely to be of the population (Field, 2009) is equally telling as the relative standard error (standard error relative to the mean in this case) is 25 per cent or less

| | *n* | Minimum | Maximum | Mean | SE | SD | Variance |
|---|---|---|---|---|---|---|---|
| Control and meetings' organisation | 128 | 1.67 | 5.00 | 3.8241 | 0.07137 | 0.80434 | 0.647 |
| Board activity | 128 | 1.00 | 5.00 | 3.5885 | 0.07473 | 0.84543 | 0.715 |
| Effective communication | 128 | 1.00 | 5.00 | 4.0052 | 0.07973 | 0.90201 | 0.814 |
| Employee safety | 128 | 1.00 | 5.00 | 3.7969 | 0.07749 | 0.87668 | 0.769 |
| Entrepreneurship skills | 128 | 1.67 | 5.00 | 3.7682 | 0.06763 | 0.76512 | 0.585 |
| Employee recognition | 128 | 1.00 | 5.00 | 3.9606 | 0.06948 | 0.78299 | 0.613 |
| Employee welfare | 128 | 1.00 | 5.00 | 3.4160 | 0.08255 | 0.93398 | 0.872 |
| Entrepreneurial development | 128 | 1.67 | 5.00 | 3.4934 | 0.07339 | 0.82707 | 0.684 |
| Organisational capital | 128 | 1.67 | 5.00 | 3.8942 | 0.07054 | 0.79179 | 0.627 |
| Structural capital | 128 | 1.33 | 5.00 | 3.8845 | 0.06670 | 0.75169 | 0.565 |
| Effective partnership | 128 | 1.33 | 5.00 | 3.7422 | 0.06543 | 0.74031 | 0.548 |
| Boundary spanning | 128 | 1.33 | 5.00 | 3.7865 | 0.06380 | 0.72178 | 0.521 |
| Control of the organisation | 128 | 1.00 | 5.00 | 3.8464 | 0.06467 | 0.73162 | 0.535 |
| Firm performance | 128 | 1.00 | 5.00 | 3.7148 | 0.07090 | 0.80215 | 0.643 |

**Table I.** Descriptive statistics

suggesting reasonable accuracy (The State of Queensland, Office of Economic and Statistical Research, Queensland Treasury, 2011).

In order to satisfy the objective, I use CFA to establish the measurement portion of board governance. The measurement portion of board governance model is good (see Figure 1) – the lowest $R^2$ value is 0.490 (tb22), the other $R^2$ values are higher, indicating the model is accounting for a large portion of the variance in the measured items. All the fit indices are acceptable (see Table II). Moreover, the AVE is 0.60. Besides, the fit indices suggest that the model fits the data acceptably in the population of interest.

The measurement portion of IC model is very good (see Figure 2). Besides, the fit indices suggest that the model fits the data acceptably in the population of interest (see Table III). Except for five items whose $R^2$ values are below 0.5, the remaining

| Model | df | $\chi^2$ | *p* | TLI | GFI | AGFI | RMSEA |
|---|---|---|---|---|---|---|---|
| Four-factor CFA model (CMO_) | 2 | 2.966 | 0.227 | 0.934 | 0.988 | 0.942 | 0.062 |
| Four-factor CFA model (E_COM) | 1 | 0.731 | 0.393 | 1.005 | 0.996 | 0.977 | 0.0001 |
| Three-factor CFA model (B_A) | 1 | 2.835 | 0.092 | 0.943 | 0.985 | 0.913 | 0.120 |
| Three-factor measurement model (board governance) | 24 | 24.197 | 0.450 | 0.999 | 0.958 | 0.922 | 0.008 |

**Table II.** Summary fit indices for board governance model

| Model | df | $\chi^2$ | *p* | NFI | TLI | GFI | AGFI | RMSEA |
|---|---|---|---|---|---|---|---|---|
| Three-factor CFA model (employee safety) | 1 | 0.054 | 0.817 | 1.000 | 1.013 | 1.000 | 0.998 | 0.0001 |
| Three-factor CFA model (entrepreneurial skills) | 1 | 0.056 | 0.812 | 1.000 | 1.023 | 1.000 | 0.998 | 0.0001 |
| Three-factor CFA model (employee recognition) | 1 | 0.024 | 0.876 | 1.000 | 1.022 | 1.000 | 0.999 | 0.0001 |
| Four-factor CFA model (employee welfare) | 2 | 0.019 | 0.991 | 1.000 | 1.034 | 1.000 | 1.000 | 0.0001 |
| Three-factor CFA model (entrepreneurial development) | 1 | 0.314 | 0.575 | 0.998 | 1.013 | 0.998 | 0.990 | 0.0001 |
| Three-factor CFA model (organisational capital) | 1 | 0.023 | 0.878 | 1.000 | 1.027 | 1.000 | 0.999 | 0.0001 |
| Three-factor CFA model (structural capital) | 1 | 0.422 | 0.516 | 0.995 | 1.023 | 0.998 | 0.987 | 0.0001 |
| Overall three-factor CFA model (intellectual capital) | 1 | 0.312 | 0.577 | 0.996 | 1.026 | 0.998 | 0.990 | 0.0001 |

**Table III.** The fit indices for intellectual capital concept

17 items have $R^2$ values above 0.5 which means that the model is accounting for a large portion of the variance in the measured items. Moreover, the AVE is 0.586.

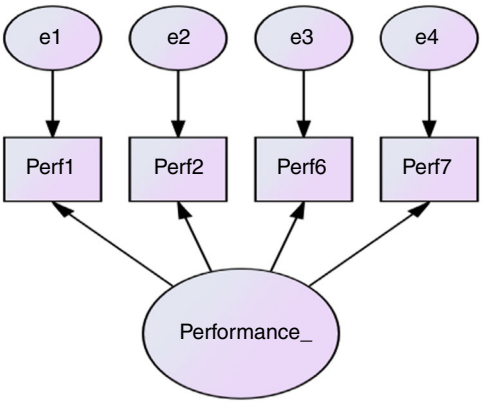
The CFA for perceived firm financial performance can be discerned from the model in Figure 3. The model's normed fit index (NFI) of 0.989 indicates strong convergent validity (Mark and Sockel, 2001). The model returned a $\chi^2$ value of 3.739 and is non-significant at the 0.05 level: its $p$-value is 0.154 suggesting that the model fits the data well in the population. More evidence is provided by the RMSEA = 0.083 which is further supported by the TLI result of 0.976. Additionally, GFI = 0.986 and AGFI = 0.931 are larger than 0.9 which reflects a good fit.

*Board governance and perceived firm financial performance*

The change in perceived firm financial performance for a unit increase in board governance is tested for. The results depicted in Figure 4 indicate a significant positive relationship between board governance and perceived financial performance, $p$ (two-tailed) $< 0.001$. Figure 4 reveals that there is a significant regression between board governance and perceived financial performance. One unit increase in board governance leads to 0.18 positive changes in firm perceived financial performance. All the unconstrained parameter estimates are significant at $p$ (two-tailed) $< 0.001$ (see Table IV). These results provide support for *H1*.

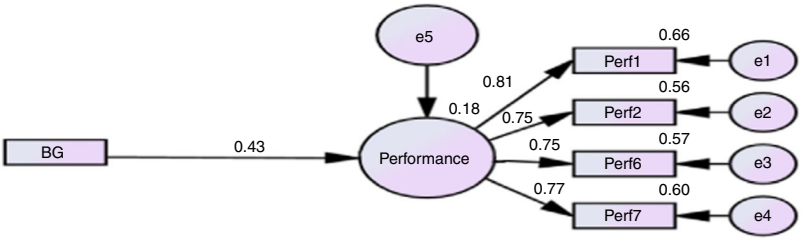
*IC and perceived firm financial performance*

The change in firm perceived financial performance for a unit increase in IC is also tested for. The results depicted in Figure 5 show a significant positive relationship between IC and perceived financial performance, $p$ (two-tailed) $< 0.001$. Figure 5 reveals that there is a significant regression between IC and perceived financial performance. One unit




**Notes:** Perf1, our firm has positive equity returns; Perf2, our organisation is highly profitable; Perf6, we have superior finanicial performance; perf7, our investments are really profitable. $\chi^2$=3.739, df=2, $p$=0.154, RMR=0.004, GFI=0.986, AGFI=0.931, TLI=0.976, CFA=\cfa, NFI=0.983, RMSEA=0.083. CFA for Firm Performance

**Figure 3.**
Perceived financial performance



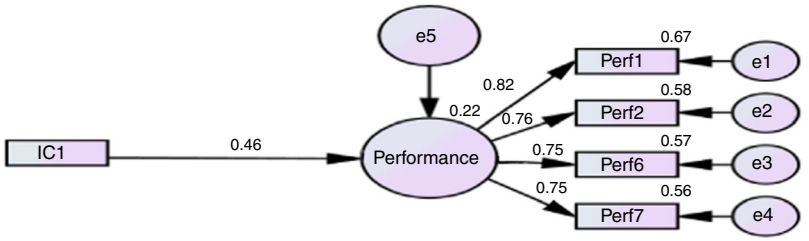

**Notes:** Perf1, our firm has positive equity returns; Perf2, our organisation is highly profitable; Perf6, we have superior financial performance; Perf7, our investments are really profitable. $\chi^2 = 5.121$, df = 5, $p = 0.401$, GFI = 0.985, AGFI = 0.954, NFI = 0.979, TLI = 0.999, RMSEA = 0.014, CFI = 0.999. The model of board governance (BG) explaining perceived financial performance

**Figure 4.**
Board governance and perceived financial performance

| | Unstandardised Path coeff. | SE | CR | *p* | Standardised path coeff. |
|---|---|---|---|---|---|
| Performance ← BG | 0.495 | 0.107 | 4.645 | *** | 0.426 |
| Perf1 ← performance | 1.000 | | | | 0.813 |
| Perf2 ← performance | 0.958 | 0.111 | 8.609 | *** | 0.750 |
| Perf6 ← performance | 0.843 | 0.098 | 8.650 | *** | 0.753 |
| Perf7 ← performance | 0.801 | 0.090 | 8.889 | *** | 0.773 |

**Note:** ***$p < 0.01$

**Table IV.**
Path coefficients for explanation of perceived firm financial performance using board governance




**Notes:** Perf1, our firm has positive equity returns; Perf2, our organisation is highly profitable; Perf6, we have superior financial performance; Perf7, our investments are really profitable. $\chi^2 = 8.814$, df = 5, $p = 0.117$, GFI = 0.975, AGFI = 0.924, NFI = 0.965, TLI = 0.968, RMSEA = 0.077, CFI = 0.984. The model of intellectual capital (IC) explaining perceived financial performance

**Figure 5.**
Intellectual capital and perceived financial performance

increase in IC leads to 0.22 positive changes in firm financial performance. Moreover, all the unconstrained parameter estimates are significant at *p* (two-tailed) $< 0.001$ (see Table V). These results provide support for *H2*.

*Multiplicative effect of board governance and IC on perceived firm financial performance*

The position of this paper is to establish the relationship between the multiplicative effect of board governance and IC on perceived firm financial performance which requires testing the hypothesis that IC interacts with board governance to positively influence firm financial performance using SEM with AMOS. The main advantage of using SEM here is

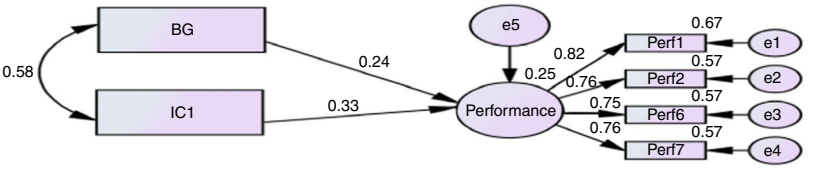
that the resulting model clearly distinguishes the true variance (variance of factor) and the error variance (residual variance) (Fürst and Ghisletta, 2009). The model in Figure 7 indicates that the multiplicative effects of IC and board governance have a significant influence on firm performance and all the unconstrained parameter estimates are significant at $p$ (two-tailed) $< 0.001$ (see Table VII). Overall, the predictors explain approximately 40 per cent of the variance in perceived firm financial performance. This appears to substantiate *H3*. And the relationship is significant at $p$ (two-tailed) $< 0.001$.

However, support for hypothesis *H3*: needs further substantiation. In this analysis I explore five models. Figures 4 and 5 are intended to show the results of tests for *H1* and *H2*, respectively but have to be used to substantiate *H3*. Further, owing to the fact both IC and board governance have been advanced in literature as plausible explanatory variables for financial performance, I explore a model to investigate this possibility and enter both of them in the same model as in Figure 6 and Table VI. I also explore the model in Figure 8 following the same reasoning but this model tests the multiplication effects without controlling for the main effects (Table VI).

**Table V.**
Path coefficients for explanation of perceived firm financial performance using intellectual capital

| | Unstandardised path coeff. | SE | CR | $p$ | Standardised path coeff. |
|---|---|---|---|---|---|
| Performance ← IC1 | 0.632 | 0.123 | 5.129 | *** | 0.465 |
| Perf1 ← performance | 1.000 | | | | 0.822 |
| Perf2 ← performance | 0.960 | 0.109 | 8.827 | *** | 0.759 |
| Perf6 ← performance | 0.837 | 0.095 | 8.768 | *** | 0.755 |
| Perf7 ← performance | 0.771 | 0.088 | 8.721 | *** | 0.751 |

**Note:** ***$p < 0.01$




**Notes:** Perf1, our firm has positive equity returns; Perf2, our organisation is highly profitable; Perf6, we have superior financial performance; Perf7, our investments are really profitable. $\chi^2 = 13.271$, df = 8, $p = 0.103$, GFI = 0.968, AGFI = 0.916, NFI = 0.957, TLI = 0.967, RMSEA = 0.072, CFI = 0.982. The model of board governance (BG) and intellectual capital (IC) in explaining perceived financial performance

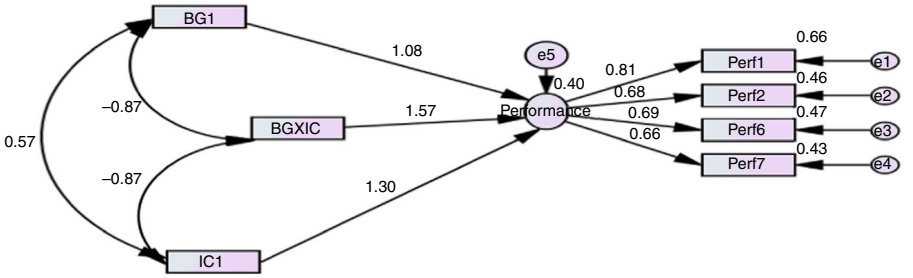
**Figure 6.**
Board governance, intellectual and perceived financial performance

**Table VI.**
Path coefficients for board governance, intellectual capital and firm performance

| | Unstandardised path coeff. | SE | CR | $p$ | Standardised path coeff. |
|---|---|---|---|---|---|
| Performance ← BG | 0.279 | 0.123 | 2.273 | 0.023 | 0.238 |
| Performance ← IC1 | 0.445 | 0.143 | 3.106 | 0.002 | 0.327 |
| Perf1 ← performance | 1.000 | | | | 0.821 |
| Perf2 ← performance | 0.955 | 0.109 | 8.793 | *** | 0.755 |
| Perf6 ← performance | 0.835 | 0.095 | 8.763 | *** | 0.753 |
| Perf7 ← performance | 0.778 | 0.088 | 8.833 | *** | 0.758 |

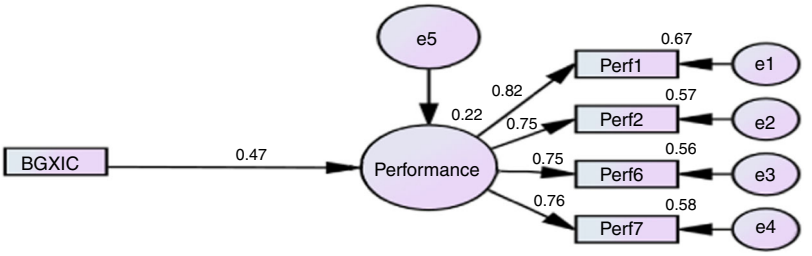
**Note:** ***$p < 0.01$

So I compare the five models to establish which one is better using Morgan and Hunt (1994) criteria in a SEM model comparison: first, overall model fit as measured by CFI; second, percentage of hypothesised significant paths; third, amount of variance explained as measured by squared multiple correlations (SMC) which are similar to Adjusted $R^2$; and fourth, parsimony assessed by the parsimonious NFI. All the paths for the models are significant at 0.05 or better. The results of using board governance alone to explain performance (see Figure 4) show SMC = 0.18, NFI = 0.979 and CFI = 0.999. Similarly, using IC to explain performance (see Figure 5) shows SMC = 0.22, NFI = 0.965 and CFI = 0.984. Using both board governance and IC in one model (see Figure 6) to predict performance shows SMC = 0.25, NFI = 0.957 and CFI = 0.982. Including the interaction term and the main effects in one model (see Figure 7) shows SMC = 0.40, NFI = 0.973 and CFI = 0.990. Other fit indices show that all these models are fairly acceptable. Model (see Figure 8) returns SMC = 0.22, NFI = 0.978 and CFI = 0.998. Although, models VI and VII have higher predictive powers, their NFI and CFI are lower than for the model in Figure 8. Thus using Morgan and Hunt (1994) criteria suggests that the model in Figure 8 is better but the model in Figure 7 has the highest SMC ($R^2 = 0.40$).




**Notes:** BG1, board governance; IC1, intellectual capital; BGXIC, interaction between board governance and intellectual capital. $\chi^2 = 17.149$, $p = 0.104$, df = 11, GFI = 0.960, AGFI = 0.899, NFI = 0.973, TLI = 0.981, CFI = 0.990, RMSEA = 0.070. Interaction term and the main effects

**Figure 7.** Multiplicative model (controlling for the main effects of board governance and intellectual capital) in predicting perceived firm performance




**Notes:** Perf1, our firm has positive equity returns; Perf2, our organisation is highly profitable; Perf6, we have superior financial performance; Perf7, our investments are really profitable. $\chi^2 = 5.543$, df = 5, $p = 0.353$, GFI = 0.983, AGFI = 0.950, NFI = 0.978, TLI = 0.995, RMSEA = 0.029, CFI = 0.998. The hypothesised (multiplicative model) of board governance (BG) and intellectual capital (IC) explaining perceived financial performance

**Figure 8.** Multiplicative model of board governance and intellectual capital predicting perceived firm performance

As intimated in the methodology section, because of the small sample I check the convergence of Bayesian Markov Chain Monte Carlo (MCMC) method by adopting MCMC algorithm of maximum likelihood. To estimate the MCMC convergence, I adopt two methods, namely: convergence in distribution and convergence of posterior summaries. The values of posterior means accurately estimate all the models. The highest value of convergence statistics for all the models is 1.000 which is less than the conservative 1.002 measure (Gelman *et al.*, 2004). I then extend the analysis to posterior predictive *p*-values. Lee and Song (2003) describe posterior predictive *p*-values. A posterior predictive *p*-value should be near 0.5 for a correct model, with values towards the extremes of 0 or 1 indicating that a model is not plausible (Gelman *et al.*, 2004; Lee, 2007). Moreover the deviance information criterion (DIC) is a statistic for comparing the fit of competing models, with smaller values being better (Gelman *et al.*, 2004; Lee, 2007). The competing model in Figure 6 returns a posterior $p = 0.33.5$ and DIC = 47.2 while the model (in Figure 8) without controlling for the main effects returns a posterior $p = 0.46$ and DIC = 35.85 and the one controlling for the main effects returns a posterior $p = 41.4$ and DIC = 53.18. I then conclude that the models with interaction terms are better; again substantiating *H3* (Tables VII and VIII).

So it follows that the interaction (multiplication) of IC and board governance explains more of the variance in overall firm financial performance than the direct influence of IC or board governance on their own. This is further substantiated in model in Figure 7 with the highest predictive power ($R^2 = 0.40$). The model in Figure 7 suggests that the multiplicative effects are accounting for a significant share of this variance in firm performance. Consequently this modelling (Figure 7) enhances our understanding of perceived firm financial performance; it offers improvement in the ability to predict perceived firm financial performance given knowledge of board governance and IC. The inclusion of interactive term (BGXIC) in model in Figure 7

**Table VII.**
Path coefficients for explanation of perceived firm financial performance model

| | UnStandardised path coeff. | SE | CR | *p* | Standardised path coeff. |
|---|---|---|---|---|---|
| Performance ← IC1 | 1.693 | 0.388 | 4.367 | *** | 1.299 |
| Performance ← BG1 | 1.281 | 0.343 | 3.733 | *** | 1.076 |
| Performance ← BGXIC | 0.138 | 0.043 | 3.238 | 0.001 | 1.571 |
| Perf1 ← performance | 1.000 | | | | 0.811 |
| Perf2 ← performance | 0.910 | 0.130 | 6.994 | *** | 0.682 |
| Perf6 ← performance | 0.810 | 0.115 | 7.060 | *** | 0.688 |
| Perf7 ← performance | 0.684 | 0.102 | 6.717 | *** | 0.656 |

**Notes:** Controlling for the main effects of board governance and intellectual capital. ***$p < 0.01$

**Table VIII.**
Path coefficients without the main effects

| | Unstandardised path coeff. | SE | CR | *p* | Standardised path coeff. |
|---|---|---|---|---|---|
| Performance ← BGXIC | 0.473 | 0.092 | 5.134 | *** | 0.466 |
| Perf1 ← performance | 1.000 | | | | 0.820 |
| Perf2 ← performance | 0.955 | 0.109 | 8.755 | *** | 0.755 |
| Perf6 ← performance | 0.834 | 0.096 | 8.712 | *** | 0.751 |
| Perf7 ← performance | 0.782 | 0.088 | 8.841 | *** | 0.761 |

**Notes:** Path coefficients for explanation of perceived firm financial performance using the product of board governance and intellectual capital only. ***$p < 0.01$

increases the predictive power of board governance and IC from 25 per cent in the model in Figure 6 to 40 per cent in the model in Figure 7. The results show that the interactive-term boosts the main effects (board governance and IC) to explain the variance in firm financial performance. Since the interaction term is significant (Table VII), it is maintained that *H3* is supported.

## Discussion

The results that board governance (consisting of control and meetings' organisation, board activity and effective communication) is significantly related to performance and, indeed, a significant predictor suggests that board meetings have a significant effect on firm performance. It suggests that better control and meetings organisation can be taken as a proxy for enhanced board oversight of senior management. This agency theory perspective confirms the view that was taken by Davila and Penalva (2005) that frequent board meetings should be taken as a proxy for enhanced board control of senior management. Similarly, the results of this study emphasise key factors of board effectiveness as those influencing the processes within boards (e.g. making greater use of management committee deliberations, building stronger controls and processes and its rigorousness in delegating operational management). The results too suggest that effective communication (e.g. advance delivery of board meeting notices, drafting of clear minutes and delivery of board papers in advance) is a critical board governance perspective that affects the performance of a firm. This is consistent with the observation of Brennan and Solomon (2008) that one of the effective governance variables predicted to influence disclosure and transparency is the board of directors. This paper suggests that this can be done in form of clear drafting of their deliberations for the benefit of e.g. management. Since board minutes provide a clear and concise summary of the meeting and reflect the board's due diligence in decision making, they reflect the major discussions and decisions of the board, provide information to new directors, serve as a reminder to meeting participants of deliberations and/or actions, and an update for members unable to attend and provide documentation for chief executive's follow up. This board governance processes should affect firm performance because they act as a monitor for board members fulfilment of their duties.

The results of this study also confirm that IC has a positive significant relationship with perceived firm financial performance just as Nimtrakoon (2015) has recently confirmed a positive relationship between IC and financial performance measures. Riahi-Belkaoui (2003) states that in an efficient market, organisations with a higher degree of IC will show higher market values and according to Nimtrakoon (2015) this implies that IC is an important resource contributing to firms' performance. This study shows that human capital in service firms (consisting of employ safety, entrepreneurial skills, employee recognition, welfare and entrepreneurial development), structural capital and organisational capital are critical value drivers of financial performance. This study further supports the conclusions made in Bontis *et al.*'s (2000) study. Their study concluded that human capital is a significant factor in the way in which businesses are run and that structural capital has a positive influence on business performance. The established firms' organisational manuals and administrative systems (organisational capital) and structural capital (in this case consisting of supplier contracts, up-to-date technology and firms' investment in databases and management information systems) contribute the firms' human capital to influence performance.

The foregoing two paragraphs suggest that while board governance presents guidelines for proper resource allocation and management (Safieddine *et al.*, 2009),

firms' IC helps create a system of value creation – all geared at firm financial performance. This is the core argument of the paper, that the interaction of board governance and intellectual explain more of the variance in firm performance than the main effects on their own. The result of significant positive multiplicative effects of board governance and IC suggest that partnering with appropriate forms of IC in services firms should have a multiplicative effect that is critical for firms' financial performance. This notion forms a foundation for the model in this paper that underlines the importance of boards partnering with the vital IC residing in organisations other than their own (board's) capital in influencing firm performance. The importance of multiplicative effects of board governance and IC on firm performance established in this study offers credence to the observation of Ruzevicius (2006) in the EFQM model of excellence that leadership is linked with three IC elements. Moreover, Juan and Rodríguez-Ruiz (2008) showed that it is possible to discern associations between management's (and board's) pursuit of excellence and IC. Taken together, the observation of Ruzevicius (2006) and Juan and Rodríguez-Ruiz (2008) clearly indicate a collaborating relationship between board governance and IC which the results of this study indicate as multiplicative. Thus effective board governance together with a supportive IC leads to positive influences on firm performance. Therefore, researchers are often in error when they attempt to explain firm performance via board governance or IC independently. This research has shown that the two must exist in a multiplicative fashion to improve firm performance.

The current results support the idea that a research design involving at least two independent variables should consider more than simply the main effects of each of the independent variables (Friedrich, 1982), including the multiplicative effects. Board governance will positively influence firm performance given a level of firm's IC and IC will positively influence firm performance given a level of board governance. These results indicate that board governance and intellectual cause a magnitude effect on firm performance hence the assumption of non-additivity is met (Friedrich, 1982; Aiken and West, 1991; Jose, 2008). It signifies that that the two must co-exist to influence firm performance in Ugandan services sector. In other words, firm performance improves as board governance becomes more effective and IC levels are enhanced, suggesting that an interactive effect of board governance and IC is significant in Ugandan services sector firms. Combining the two variables boosts further the performance of service firms than what one of the variables would have single-handedly registered.

## Concluding remarks

This paper examines the multiplicative effect of board governance and IC on services firms' performance. The present study surveys 128 managers and members of the board (directors). Board governance and IC make significant contributions to firm performance. However, while board governance and IC positively and significantly influence firm performance, their interaction is a significant booster to services sector firms performance in Uganda.

This paper offers important academic and managerial contributions. It contributes to academic research by producing empirical evidence to support theories relevant to the explanation of firm financial performance. This study has shown that the multiplicative effect of board governance and IC can be investigated following a multi-theoretic approach of agency, resource-dependency and resource-based theories. In this regard it is meaningful to identify the significant positive multiplicative effects of board governance

and IC so as uncover what is needed in service firms to improve their performance. This paper has indicated that indeed ineffective board governance and weak IC are the ills vitiating firm performance improvements in Ugandan services sector firms. The findings of this study are important for services firms wishing to determine the possible required changes for the development of IC and board governance with the aim of obtaining the required synergies. Primarily, the measurement models of board governance and IC reported in this paper allow service firms to evaluate the effectiveness of board governance and IC assets in their firms. Effective board governance can easily assist the service sector firms by infusing better board communication processes, meetings' processes and better performance of board roles or activities. For example, service firms can use effective communication strategies like the ones confirmed in this study to improve transparency at board level. Indeed from the information flow perspective, service firms' boards that establish effective communication strategies are more likely to come up with better strategies for enhancing their collaboration with human capital residing in the firm other than their (board's) and also for leveraging other forms of IC than probably those firms that do not. Lastly, boards' deliberations will need to be carefully documented in form of minutes and will require skills that nurture a collaborative approach between them and management.

As with any study, there are a number of limitations with the present study. First, the questionnaire was self-administered and I did not undertake follow up interviews which would have informed me of the reasons why the respondents held certain views. Second, the present study is cross-sectional; it is possible that the views held by individuals may change over the years. Finally, although there is an attempt at controlling for CMV in particular with proactive instrument design and testing, and usage of the Harman single factor analytical technique, the influence of CMV may not have been dealt away completely owing to failure to finding a plausible common marker variable. The analytical technique while superior to Harman one factor requires that the researcher knows the most important sources of method bias and construct an appropriate collection. As the sources of bias could not be fully understood with sufficient detail to model, this is acknowledged as a limitation of our study. According to Eichhorn (2014) even if the sources are understood, some may not be measurable due to psychological factors or those implied within the survey instrument itself. Well, policy makers of Uganda dealing with financial markets, academicians, company directors, company owners and even general readers interested in the field of corporate governance and IC development might find this study useful. Future research may wish to test this study's model in predicting firm financial performance in developed economies.

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