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CEO CHARACTERISTICS AND INTELLECTUAL CAPITAL EFFECTIVENESS: EMPIRICAL EVIDENCE FROM THE UK

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Abstract : *Intellectual capital has been widely studied in the context of broader corporate governance structures. There is little empirical research on CEO relationships. Nevertheless, CEOs have a great responsibility to leverage the intellectual capital that their employees bring to their organisations. Given this gap, this study examines the impact of CEOs on improving a company's intellectual capital. In this study, CEOs are represented by dual CEO status, nationality, gender, seniority, income and ownership, while the Intelligence Value Added Score measures intellectual capital.*

All data are collected from the annual and yearly accounts of the companies and analysed by descriptive statistics, correlation and regression analysis after regression diagnosis. The results show that CEOs have a significant impact on intellectual capital. The study therefore concludes that CEO characteristics are a key factor in the intellectual capital of UK firms. However, these results are limited to listed financial and non-financial services companies and the control variables used. Furthermore, this study establishes the relationship between CEOs and intellectual capital, and further research is needed on how to make the necessary improvements.

Key words

CEO duality, CEO gender, CEO nationality, CEO ownership, CEO seniority, CEO rotation and intellectual capital.

1. Introduction

Intellectual capital (IC) is underutilised in developing countries in general, and in the UK in particular. This probably explains the high level of development and the presence of great infrastructure, as well as the high degree of prosperity, low unemployment and lack of wealth inequality. Companies can contribute to this, especially if they can tap into the vast potential of the intellectual capital of their employees.

Despite the use of intellectual competence (IC) in the UK, there is no shortage of academic research on the subject. However, most of these articles combine Intellectual Competence with other topics. The aim of this paper is therefore to examine the impact of CEO attributes on the intellectual capital of distressed UK listed financial services firms. The aim of this paper is to confirm that perhaps the most active person in charge of the company's affairs, the CEO, can bring about some of the desired changes to the issue of harnessing the potential of intellectual capital. As Stewart (2010) explains, IC is the new wealth of organisations.

The CEO is the most senior official in the company. Although representing the interests of the major investors, the CEO is an employee, whether he or she is a preferred employee or a first employee. Since the CEO is accountable to the board, he or she must recognize that he or she is subject to the board's whims. The main responsibilities of a CEO include setting and executing strategy, allocating resources, building a management team and regularly monitoring performance.

Therefore, CEOs need strong communication skills, leadership skills and an unparalleled passion for the company, its owners and other stakeholders. CEOs sometimes take on other roles to ensure that results are achieved within reasonable budgets. In many organisations, the CEO's job is primarily to grow the business. Other employees may bring their own skills and knowledge to do the job once they are within reach of the CEO.
We examine CEOs according to six CEO characteristics: CEO duality, gender, ownership, nationality, seniority and income. It should be recognised that other CEO characteristics, such as age, ethnicity, education and experience, are easily identifiable. Future research could cover these traits, but for the purposes of this article we will limit CEO traits to the six above.
This article will be useful to regulators, shareholders, lenders and other stakeholders, as CEOs are expected to make better use of the potential embedded in their intellectual capital. For example, various levels of government will benefit from lower unemployment rates as companies develop new skills to take advantage of the human resources available in the country. In addition, tax authorities can generate more tax revenue from workers and firms by making better use of human capital.
Business regulators such as the FTSE100, the Securities and Exchange Commission and the Financial Reporting Council will have an easier job if they determine that a company is doing well. In addition, existing and potential shareholders would appreciate a clear understanding of the companies receiving their investment capital. For example, the world's most respectable companies (Apple, Amazon, Microsoft, Walmart, BP, Meta, Alphabet, Berkshire, Tesla, Tencent, Visa, Johnson & Johnson, Alibaba Group, Saudi Aramco, ExxonMobil, AT&T, Nvidia, Coke) - Coke, Bank of America, JP Morgan Chase, Cisco, Intel, Nasdaq, The Home Depot - did not come into existence by chance. On the contrary, they are distinguished above all by their ability to use the human resources at their disposal.

1. Review of the literature

1.1 CEO

The CEO is the top management of an institution. The CEO typically makes key decisions for the company, manages day-to-day operations, and communicates with the board of directors, shareholders, regulators, tax authorities, lenders, customers, suppliers and insiders such as employees and management. In many companies, the CEO is a well-known public

face. The CEO is elected or appointed by the board of directors and its shareholders, but is accountable to the company's shareholder-appointed chairman and board.
The responsibilities of a CEO vary from company to company depending on size, experience, culture, structure, values and ownership. In some organisations the CEO may only be involved in very strategic decisions such as strategy, culture and organisation. He can also be involved.
A Harvard study found that CEOs spend 72% of their time in meetings, 28% alone and 25% in relationships. In addition, the CEO spends time as follows: 25% on business review, 21% on strategy development, 16% on culture and organisation, 1% on crisis management and 3% on customer relations. The remaining 9% is dedicated to personal matters. Nevertheless, it is important to note that the CEO sets the tone, vision and culture of the organisation. This white paper examines the impact of CEOs on the CI based on characteristics such as duality, gender, seniority, nationality, ownership and income.

1.2. Intellectual capital

Intellectual competence is the value that a company derives from the knowledge, skills, education, know-how and information of its employees that can give them a competitive advantage over others. It is also defined as the value provided by the collective knowledge and resources of a company.
This theory resolves potential conflicts between shareholders and CEOs by arguing that the CEO's job is always to protect the interests of shareholders in the operations of the company.

1.3. The Theory of Stewardship

As the name implies, stewardship theory implies that a company is at the mercy of its shareholders and other stakeholders, including the communities in which it operates, to serve them. The CEO is the face of the company to the outside world and must serve the interests of all stakeholders. The key word here is 'manager' and the CEO should be seen as a service provider.

1.4. Stakeholder Theory

Stakeholder theory is the understanding that companies have multiple stakeholders, including people inside and outside the company, such as governments, regulators, tax authorities, shareholders, boards, employees, suppliers, customers, lenders, etc. Make sure that the interests of these stakeholder groups are always balanced. It is therefore the responsibility of the company to ensure that the interests of these stakeholders are always balanced. The concept of

corporate social responsibility, which is now receiving a lot of attention in the theoretical and empirical literature, probably originated from this perspective.

1.5. CEOs and intellectual capital

Empirically, Nadeem et al. (2021) studied the relationship between CEOs' management skills and investment in intellectual capital and found a significantly positive association with investment in human capital, innovation and relational capital. Similarly, Ullah et al (2022) examined the relationship between ethical leadership, corporate social responsibility and CI by CEOs. They found positive and significant relationships, especially with regard to human and social capital.

Hidalgo et al (2011) studied the relationship between corporate governance and intellectual capital and found that board size was positively associated with intellectual capital but negatively associated with institutional investors. In addition, Battisti et al (2021) examined the relationship between CEO and intellectual capital in the China Stock 100 index for the period 2016-2018. A female CEO has a positive effect on intellectual capital, and the younger the CEO, the larger the effect.

Similarly, Mardini and Lahyani (2020) used agency theory and agency theory to examine the impact of corporate financial performance and corporate governance mechanisms on CID disclosure by SPF-120 firms. They found that a company's financial performance indicators play an important role in determining the extent of CID. Among the corporate governance mechanisms, they found that cultural and gender diversity influence some elements of the DIC. In addition, CEO characteristics such as age, education and role duality influence DCI, while institutional ownership determines the extent of such disclosure. Bontis and Nikitopoulos (2007) also discuss the growing importance of DCI in a book entitled Managing Organizational Knowledge Through Diagnosis of DCI. Frame the state of the field and move on."

In addition, Cerbioni and Parbonetti (2007) explored the effects of corporate governance on ICD using European biotechnology companies. Their results suggest that governance variables strongly influence the amount of information disclosed. Specifically, their results show that the proportion of independent directors is positively related to disclosure, that CEO duality is negatively related to forward-looking disclosure, and that board structure contributes to the overall readability of the annual report.

Abhayawansa and Guthrie (2010) reviewed and synthesised existing knowledge on the importance of intellectual capital (IC) disclosure in capital markets. They concluded that these studies provide evidence of the usefulness and importance of many types of IC information. They also found that research on IC disclosures in IPOs highlights the perceived importance of IC disclosure styles for capital markets. In addition, O'Regan et al (2001) reviewed the Irish software and telecommunications sector and provided empirical evidence of the continued and vital importance of intellectual capital. The results showed consistency in the composition of human, internal and external components of intellectual capital.

Bose and Thomas (2007) studied IC in relation to performance measurement issues in a large Australian company (The Fosters Brewing Group). In this company, the newly appointed CEO reversed a decline in performance by, among other things, adopting a balanced scorecard

management approach. In addition, Bontis (2003) describes a study that conducted a content analysis of the annual reports of 10,000 Canadian companies. A search of the list of intellectual capital terms in the annual reports provided numerous examples of intellectual capital disclosures. A key recommendation for companies concerned about their relationship with capital markets is to develop strategic and tactical initiatives, including voluntary disclosure of intellectual property.

In addition, Hooper (2016) used the VAIC model to examine the relationship between CEO compensation and intellectual capital as a measure of organisational performance for 90 NASDAQ-listed companies over the period 2009-2014. . The results show that employee capital efficiency, a sub-component of VAIC, is the only significant predictor of CEO pay variability. Caddy (2000) argues that the current treatment of an organisation's intellectual capital is rather superficial. He argues that intellectual capital is best calculated as a net figure (intellectual assets minus intellectual liabilities) rather than as a simple sum of an organisation's identified intellectual assets.

Tseng et al (2005) examined the relationship between intellectual capital and firm value in emerging markets. The empirical results show a positive correlation between Taiwanese manufacturers' intellectual capital and firm value. Similarly, Martakin et al (2015) conducted an empirical study on the relationship between corporate governance and DIC coverage in Bangladeshi firms. Their main results suggest a non-linear relationship between family ownership and CID coverage. Foreign ownership, board independence and the presence of an audit committee were positively correlated with CID size. Conversely, family duality was negatively associated with the extent of CID.

Appuhami and Bhuyan (2015) investigated the impact of corporate governance (CG) on ICD in a large Australian service company. The regression analysis revealed a significant duality in the composition of the CEO, the board of directors and the compensation committee. Edvinsson (1997) described Skandia's approach to measuring intellectual capital. Because traditional accounting systems do not represent either 'human capital' or 'structural capital', Skandia has developed a unique way of capturing the true value potential of an organisation using two models. In addition, Guo et al (2012) aims to understand the impact of intellectual capital on the performance of 279 publicly traded US biotechnology companies over the period 1994-2005.

This result indicates that the relationship between patents and R&D expenditure is positive, but increasing patents does not significantly improve accounting.

In contrast, there is no evidence that the size of the supervisory board and the composition of the audit committee affect intellectual competence. Furthermore, Li et al (2008) Relationship between Intellectual Competence and Governance controlling for other firm-specific characteristics for a sample of 100 UK listed firms. The results of the analysis based on the three measures of intellectual capital disclosure showed significant associations with all governance factors, except for role duality.

Ismail (2005) investigated the impact of intellectual capital on the performance of Telekom Malysiya. This study showed that there was a significant positive relationship between relational, human, mental and structural capital, and the management and use of intellectual

capital on performance, while knowledge management was indirectly associated with performance. Chen (2004) also discusses the role of intellectual capital in creating competitive advantage and improving business strategy execution at TTY Biopharm Company, a pharmaceutical company based in Taiwan. He said that TTY's success suggests that even in a relatively small pharmaceutical market such as Taiwan, comprehensive research and development of new drugs, from discovery of new chemicals to development of new drugs, does not seem economically viable. Intellectual capital that creates a competitive advantage can overcome the limitations of domestic market size and achieve successful results.

Ulrich (1998) also argued that Intellectual Capital is the only recognisable asset of a company as other assets such as buildings, plant, equipment and machinery are depreciated at the date of acquisition. He concluded that Intellectual Capital must grow for the business to prosper. Curado (2008) captures knowledge management and intellectual capital awareness in the banking sector. His research has produced interesting results, reviewing much of the theoretical literature on knowledge management and intellectual capital and identifying the value placed on knowledge management and intellectual capital.

In addition, Subramaniam and Youndt (2005) examined the impact of intellectual capital on different organisational innovation capabilities. In multiple informative longitudinal studies of 93 organisations, they found that human, organisational and social capital, and their interrelationships, selectively influence their ability to innovate incrementally and radically. They found that organisational capital has a positive impact on the ability to innovate incrementally, while human capital interacts with social capital to have a positive impact on the ability to innovate radically. However, human capital is negatively associated with the ability to innovate radically. However, social capital plays an important role in both types of innovation, as it has a positive impact on the ability to innovate incrementally and radically.

In addition, Abeysekera (2010) uses the top 26 of 52 companies listed on the Nairobi Stock Exchange by market capitalisation in 2002 and 2003 to disclose strategic and tactical intellectual capital resources. We examined the effect of board size on firms. The study found that firms that disclosed more internal tactical and strategic human capital had larger boards. Bart (2001) sought to understand the relationship between mission statements and their impact on the concept of intellectual human capital. As a result, we found that the mission statement occupies an effective position in measuring and communicating the intellectual capital of an organisation.

Ho and Williams (2003) examined the relationship between board characteristics and firm performance in a sample of 286 listed companies from South Africa (84 companies), Sweden (94 companies) and the UK (97 companies). Similar to the general findings of studies using US data, the overall empirical analysis fails to identify consistent and significant associations between the four board characteristics and firm performance in the three countries. However, individual board characteristics have been found to affect firm performance in individual cases. Furthermore, Giuliani (2016) examined how organisations interpret and interpret CI measures in a meaningful way. Ultimately, the development of a CI project requires the development of a focused activity of making meaning and making sense, as organisational managers need to make sense of this new object and the new management practices that result. Furthermore,

Moore and Craig (2008) examined the role of CI in business success and concluded that CI is critical to business success. Selim et al (2004) describe CI in Egyptian software companies. The aim of this research was to contribute to the development of the theory of Intellectual Skills by developing measurement systems in unique situations. This paper highlights the main indicators of Intellectual Capital reported by Egyptian CEOs.

Boudreaux and Ramstad (1997) suggested that developers of human resource (HR) measurement systems could learn from the success of established measurement models in finance and marketing. They showed that the historical development of these measurement systems provides lessons for future HR measurement. Similarly, Edvinsson and Kivikas (2007), with the support of the Federal Ministry of Labour and Economic Affairs, compiled a successful pioneering prototyping project in Germany into an Intellectual Capital statement. They found that most of the participating companies wanted more standardised measures of IC value creation to use the tool as an additional report.

Sullivan (2000) discusses the problem of valuing intangible entities and proposes two approaches to determine their value. In addition, Hermans and Kauranen (2005) empirically tested the impact of CI on the expected future revenues of small and medium-sized biotechnology companies. In the econometric analysis, the interaction or empirical covariance between the three CI categories explains two-thirds of the variance in expected future sales for the sampled firms.

Makki and Lodhi (2009) used VAIC to examine the relationship between intellectual capital and return on investment (ROI). They used a seven-year dataset of companies in the Lahore Stock Exchange Index (LSE-25). The results of the multiple regression analysis support the claim that IC effectiveness contributes significantly to an organisation's ROI. Similarly, Nicholson and Kiel (2004) use the concept of board intellectual capital to synthesise current theories of corporate governance and explain how boards of directors can boost corporate performance. They further argue that directors who want to improve their performance need to rethink their intellectual capital. Finally, we link this model to a practice-based framework that identifies four key areas that boards should focus on to develop their intellectual capital.

Melalian et al (2013) developed and prioritised the most important indicators of intellectual capital in knowledge-based industries. As a result, participants were more interested in the knowledge and skills of their managers and employees from a human capital perspective, while from a structural capital perspective they were more interested in a supportive environment, the R&D investment ratio and the number of R&D projects. I found that the most interesting. In addition, Pens etc (2007) asked 30 healthcare managers how hospitals rated the importance of intellectual capital and performance in the healthcare sector. They identified key elements of intellectual capital and performance indicators considered important for performance management practices in the Taiwanese hospital industry. They showed the relative importance and ranking of human capital, organisational capital, relational capital and performance indicators.

Longo and Mura (2011) studied the impact of intellectual capital on job satisfaction and employee retention and identified two talent management practices that have a positive impact

on intellectual capital. Their findings identified two measures for human resource management practices.
Communication and coordination that have a positive impact on intellectual capital and improve job satisfaction and employee retention. Similarly, Pike et al (2002) explored the relationship between intellectual capital management and reporting and found that with regard to reporting, all intellectual capital issues were of considerable and disproportionate importance to CEOs and boards.
Ehin (2012) advocated the development of IC in organisations in his book Unlocking IC. Berezinet et al (2016) defined the role of board CI in generating corporate CI. The authors suggest that CI is generated not only by company staff, but also by governing bodies such as the board of directors, who are not always contractual members of the company in the traditional sense. They concluded that board members use their knowledge, experience and networking opportunities
Stewart (2010) called IC the new organisational wealth. Furthermore, Lonnqvist et al (2009) examined the role of IC management in the organisational change process. They concluded that a CI model can be a useful tool for change management, as it ensures that changes are aligned with the strategic goals of the organisation.
Youndt and Snell (2004) introduced intellectual capital into the strategic human resource management literature in order to begin to fill the 'black box' between HR activities and organisational performance. The results of a multi-sector survey of 208 organisations indicated that different HR activities are linked to three distinct forms of intellectual capital: human, social and knowledge. In addition, Lonnqvist et al (2009) examined the role of Intellectual Capital management in a change organisation process.
Albertini (2016) improved our knowledge of all the interrelationships between CI components by providing an inductive typology of strategic interactions. The authors used 122 of the top 200 Fortune Global 500 companies from 2008 to 2012. The results showed that the three CI components interacted with each other around a central position held by relational and structural capital and, to a lesser extent, human capital. Companies with a positive ranking increase focus more on structural capital, while companies with a negative ranking increase mention more relational capital.

2. Data and methods

This study is a correlation study that assesses the impact of CEO attributes on the intellectual capital of non-financial services companies listed on the UK FTSE100. The sample size is 97, the study period is 10 years (2012-2021) and 970 observations are obtained. Based on Nadeem et al. (2021), the study design was adjusted for control variables.

$$VAICi,t = \beta0 + \beta1CDUALi,t + \beta2CGENDi,t + \beta3CTENUi,t + \beta4CTURNi,t + \beta5COWNEi,t + \beta6CNATIi,t + \beta7LAGEi,t + \beta8LEVi,t + \beta9FSIZEi,t + \beta10GROWTi,t + \varepsilon i,t$$

With :

VAIC: Value added of intellectual capital. Measured as the sum of the efficiency of capital employed + the efficiency of human capital + the efficiency of structural capital.

CDUAL: CEO duality. It is measured by a dummy variable that assigns "1" to companies with different CEOs and chairmen, and "0" otherwise.

CGEND: Measure the gender of the CEO as a dummy variable. A company with a female CEO is assigned a "1" and a company without a female CEO is assigned a "0".

CTENU: CEO tenure is measured as a dummy variable, with '1' for companies with a CEO tenure of 3 years or less and '0' for companies with a CEO tenure of less than 3 years.

CTURN: CEO turnover rate measured by a dummy variable. A "1" is assigned to firms that have changed CEOs in a given year, and a "0" otherwise.

COWNE: CEO turnover rate measured by a dummy variable. A "1" is assigned to firms that have changed CEOs in a given year, and a "0" otherwise.

CNATI: The nationality of the CEO is measured as a dummy variable, assigned '1' to companies with foreign CEOs and '0' otherwise.

AGE: Measured by the number of years a company has been listed on the stock exchange.

FSIZE: Size of the enterprise expressed as the natural logarithm of total assets.

LEV:. Leverage, measured as total liabilities divided by total assets.

GROWT: Growth is measured as the year-to-date turnover minus the previous year's turnover divided by the previous year's turnover.

Les données ont été extraites des rapports annuels et des états financiers des entreprises de l'échantillon et analysées à l'aide de statistiques descriptives, d'analyses de corrélation et de régression après examen des diagnostics de régression. Les hypothèses sont :

Hypothèse 1 : The duality of CEOs and ICs has a lot to do with this.

Hypothèse 2 : Gender of CEO and CI are strongly correlated.

Hypothèse 3 : CEO seniority and CI are strongly correlated.

Hypothèse 4 : CEO rotation and CI go hand in hand.

Hypothèse 5 : The ownership of the CEO and CI are closely linked.

Hypothèse 6 : The nationality of the CEO and CI are closely linked

2.1. Résultats

Data analysis is carried out in this study using descriptive and inferential statistics, including regression diagnostics, as follows:

2.2. Descriptive statistics

Descriptive statistics such as number of observations, median, standard deviation, minimum mean, maximum mean can be used to better understand the types of samples used in the study and to gain insight into the variables in the study. In addition, the descriptions of the statistical data allow us to identify the dominant pattern of statistical data and to explain the relationships between the variables used in the study.

Table 1. Descriptive statistics

Variable	Obs	Mean	Std-Dev	Min	Max
VAIC	*970*	*4.107*	*1.563*	*0.02*	*10.52*
CDUAL	*970*	*0.873*	*0.0292*	*0*	*1*
CNATI	*970*	*0.239*	*0.436*	*0*	*1*
CGEND	*970*	*0.019*	*0.136*	*0*	*1*
CTENU	*970*	*0.681*	*0.467*	*0*	*1*
CTURN	*970*	*0.194*	*0.396*	*0*	*1*
COWNE	*970*	*2.551*	*6.772*	*0*	*25.081*
LEV	*970*	*0.762*	*0.22*	*0.315*	*2.478*
LAGE	*970*	*26.9*	*11.901*	*2*	*48*
FSIZE	*970*	*7.653*	*0.509*	*5.97*	*9.03*
GROWT	*970*	*25.814*	*22.332*	*0*	*99.44*

2.3. Inferential.statistics

Descriptive statistics such as number of observations, median, standard deviation, minimum mean, maximum mean can be used to better understand the types of samples used in the study and to gain insight into the variables in the study. In addition, the descriptions of the statistical data allow us to identify the dominant pattern of statistical data and to explain the relationships between the variables used in the study.

Table 2. Regression diagnoses

Test	**Chi2**	**p-Value**
Normality	*13.67*	*0.003*
Homoscedastity	*52.11*	*0.2986*
Multicollinearity	*Mean VIF*	*1.29*
Model Specificationerror		
Linktest	*_hastsq*	*0.056*
Omitted Variables	*2.08*	*0.1059*

Furthermore, since we have to test our hypothesis, the results of the residual normality test in Table 2 show that the residuals are not normally distributed. Therefore, the last method of regression analysis is the non-parametric test.
The results of the homoscedasticity test show that the residuals do not have a problem. Furthermore, the multicollinearity results show that there is no multicollinearity between the predictor and control variables.
In fact, the largest FIV is 1.88 in the CEO rotation. Furthermore, the misspecification test for both models shows that the models are correctly specified and that no variables are omitted. Table 5 shows the results of the Kolmogorov-Smirnov test.

Table 3. Non-parametric test

Variable	**Chi2**	**p-Value**
CDUAL	*12.663*	*0.000*
CNATI	*12.867*	*0.000*
CGEND	*12.907*	*0.000*
CTENU	*12.897*	*0.000*
CTURN	*11.993*	*0.000*
COWNE	*6.007*	*0.000*
LEV	*12.873*	*0.000*
LAGE	*12.876*	*0.000*
FSIZE	*12.819*	*0.000*

GROWT	*12.796*	*0.000*

2.3 Hypothesis testing

The p-value (CDUAL) for CEO duality associated with the first hypothesis is less than 0.05, thus there is a significant difference between CEO duality and VAIC, indicating that CEO duality has a significant impact on CEO intellectual capital.

For CEO nationality (CNATI), the p-value is less than 0.05, acknowledging that CEO nationality influences intellectual capital. Furthermore, for the gender of the CEO (CGEND), the p-value is less than 0.05, confirming that the gender of the CEO has a significant impact on intellectual capital. Similarly, for CEO seniority (CTENU), the p-value is less than 0.05, implying that CEO seniority has a significant impact on intellectual capital. For CEO turnover, the p-value is significant. H. Less than 0.05, CEO turnover has a significant impact on intellectual capital. For CEO ownership, the p-value is less than 0.05, suggesting that CEO ownership has a significant impact on intellectual capital.
For the control variables, Table 5 shows that the p-value for leverage (LEV) is less than 0.05. This means that leverage has a significant impact on CI. This means that leverage has a significant impact on CI. The p-value for the age of assessment (LAGE) is less than 0.05. This means that the age of assessment has a significant impact on CI. This means that the age of rating has a significant impact on CI. Similarly, for firm size (FSIZE), the p-value is less than 0.05, indicating that firm size has a significant impact on CI. Finally, for company growth (GROWT), the p-value is less than 0.05. This means that company growth has a significant impact on IC. This means that firm growth will have a significant impact on IC.

3. Discussions

This section is devoted to the discussion of the results of this study, starting with the results of the descriptive statistics. The number of observations is 970 (97 companies over 10 years) indicating that the data is balanced for all companies and years considered. The mean of VAIC is 4.107 with a standard deviation of 1.563, which is lower than the central mean, while the minimum and maximum means are 0.02 and 10.52 respectively. CEO duality has an average of 0.873 with a deviation of 0.292, which is lower than the central mean, while the minimum and maximum means are 0 and 1. CEO nationality has a mean of 0.239 with a variance of 0.436, which is above the central mean, suggesting that its volatility is a concern for the board, with the lowest and highest means being 0 and 1.
The gender of the CEO averages 0.019 with a variance of 0.136, which is higher than the central means, indicating that a female CEO is not common in the companies considered. The lowest and highest means are 0 and 1.
CEO tenure averages 0.681 with a variance of 0.467, which is below the central mean, while the minimum and maximum means are 0 and 1.
Similarly, the average CEO turnover rate is 0.194 with a variance of 0.396, which is higher than the mean, indicating a high CEO turnover rate during the study period. The minimum and

maximum means are 0 and 1. The average CEO ownership is 2,551 and the variance is 6,772, above the median mean. This means that there is a large variance in the CEO's ownership. The lowest and highest mean values are 0 and 1.

For the control variables used in this study, leverage averaged 76.2% with a spread of 22%, below the median, but with lowest and highest means of 31.5% and 247.8%, respectively. This is empirical evidence that most firms in Nigeria are highly leveraged. In terms of age of IPOs, the average age of firms is 27 years, with a standard deviation of 12 years, with minimum and maximum ages of 2 and 28 years. The average company size is 7.653 with a spread of 0.509, below the median, with minimum and maximum averages of 5.97 and 9.03. Finally, the growth rate has an average of 25.814% with a spread of 22.332%, which is lower than the median, but with minimum and maximum averages of 0% and 99%.

The second step of the discussion focused on the results of the correlation analysis. The results in Table 4 show that CEO duality is significantly negatively correlated with CI (Coeff = -0.199, p-value = 0.003). It also shows that CEO nationality is negative but not significant (coefficient = -0.153, p-value = 0.080). The gender of the CEO is positive but not significant (coefficient = 0.021, p-value = 0.841). CEO seniority is significantly positively correlated with CI (coefficient = 0.209, p-value = 0.017). However, CEO turnover is negative but not significant (coefficient = -0.193, p-value = 0.131). CEO ownership is positively and significantly correlated with CI (coefficient = 0.276, p-value = 0.003). For the control variables, leverage was significantly positively correlated with CI (coefficient = 0.228, p-value = 0.004). School age was significantly negatively correlated with the CI (coefficient = -0.156, p-value = 0.048). Company size was positive but not significant (coefficient = 0.056, p-value = 0.481). Finally, the growth rate of the firm is negative but not significant (coefficient = -0.027, p-value = 0.734).

The next step in the discussion will be the regression results. The results in Table 5 show that all variables have a significant impact on intellectual capital. These results are in line with almost all empirical studies described in the section on empirical literature, as they are too numerous to list here.

Table 4. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) VAIC	1.000										
(2) CDUAL	-0.199*	1.000									
	(0.003)										
(3) CNATI	-0.153	0.177*	1.000								
	(0.080)	(0.025)									
(4) CGEND	0.021	0.041	-0.082	1.000							
	(0.841)	(0.606)	(0.300)								
(5) CTENU	0.209*	-0.007	-0.049	-0.202*	1.000						
	(0.017)	(0.929)	(0.537)	(0.010)							
(6) CTURN	-0.193	0.146	0.031	0.282*	-0.649*	1.000					
	(0.131)	(0.066)	(0.697)	(0.000)	(0.000)						
(7) COWNE	0.276*	0.112	-0.225*	-0.052	0.229*	-0.167*	1.000				
	(0.003)	(0.158)	(0.004)	(0.512)	(0.004)	(0.035)					
(8) LEV	0.228*	-0.102	-0.135	0.044	-0.020	0.021	0.368*	1.000			
	(0.004)	(0.198)	(0.089)	(0.584)	(0.803)	(0.790)	(0.000)				
(9) LAGE	-0.156*	-0.118	-0.057	0.059	0.130	-0.142	0.055	-0.065	1.000		
	(0.048)	(0.137)	(0.472)	(0.455)	(0.102)	(0.072)	(0.493)	(0.417)			
(10) FSIZE	0.056	0.141	-0.035	0.175*	0.045	-0.006	-0.089	-0.076	0.389*	1.000	

	(0.481)	(0.074)	(0.660)	(0.027)	(0.576)	(0.938)	(0.261)	(0.338)	(0.000)		
(11) GROWT	-0.027	-0.089	0.012	-0.058	0.141	-0.099	0.116	-0.013	-0.058	-0.026	1.000
	(0.734)	(0.262)	(0.884)	(0.469)	(0.076)	(0.211)	(0.143)	(0.866)	(0.467)	(0.745)	

*** *p<0.01*, ** *p<0.05*, * *p<0.1*

Table 5. Linear regression

VAIC	Coef.	St.Err.	t-val	p-val	[95% Con	Interval]	Sig
CDUAL	-1.939	0.444	-4.37	0	-2.817	-1.062	***
CNATI	-0.031	0.263	-0.12	0.905	-.552	0.489	
CGEND	0.484	0.859	0.56	0.574	-1.214	2.181	
CTENU	0.797	0.316	2.52	0.013	0.172	1.422	**
CTURN	0.198	0.379	0.52	0.601	-0.55	0.947	
COWNE	0.054	0.019	2.80	0.006	0.016	0.092	***
LEV	0.737	0.553	1.33	0.185	-0.355	1.829	
LAGE	-0.043	0.01	-4.15	0	-0.064	-0.023	***
FSIZE	0.738	0.246	3.01	0.003	0.253	1.224	***
GROWT	-0.009	0.005	-1.69	0.092	-0.019	0.001	*
Constant	-0.37	1.823	-0.20	0.84	-3.973	3.234	
R-squared		0.269	Number of obs			160	
F-test		5.475	Prob > F			0.000	

*** *p<.01*, ** *p<.05*, * *p<.1*

Conclusion

. According to the results of this scientific research, the primary objective of the research has been achieved. Specific objectives were also achieved. These hypotheses were tested and accepted, confirming that CEOs influence intellectual capital. However, like other empirical studies, this study also has many limitations. Firstly, the choice of sector is questionable as other sectors are readily available. In addition, the results vary according to the model, method, data, variables and sectors, data sources and methods of analysis. The use of a broader set of variables may lead to different results.

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