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The Intellectual Capital Performance of the Ethiopian Banking Sector

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Abstract

Most intellectual capital (IC) research focuses on developed nations. However, some studies have been conducted on Sub-Saharan African countries such as Nigeria, Uganda, Kenya and Tanzania. Since the banking context in Ethiopia is different from others, their experience might not be enough to explain the performance of the Ethiopian banking sector. Ethiopia is one of the fastest-growing economies in Sub-Sahara Africa with a protected (non-liberalised) banking sector making the Ethiopian banking sector worthy of examination. Thus, this article aimed to assess the impact of IC on the financial performance of conventional banks. The author analysed over 17 conventional commercial banks for a period of 6 years. The research examines the relationship between IC and financial performance using panel data regression. The sensitivity of the Value-Added Intellectual Coefficient (VAIC^{TM}) to macroeconomic and firm-specific variables was also tested. The finding showed a positive correlation between bank performance and VAIC. Furthermore, the human capital and relational capital efficiencies are found critical components of VAIC in the context of this study. According to the findings, banks should invest more in their human capital investment to increase their performance.

Keywords: Intellectual Capital, VAIC, Panel Model, Human Capital Efficiency, Relational Capital Efficiency, Structural Capital Efficiency

Introduction

Since decades, researchers have emphasised the importance of knowledge economy and understood the mighty power of knowledge (Rechberg & Syed, 2013). Later, the concept was popularised in the field of business and management by the works of Drucker (1969). As defined by Powell and Snellman (2004), the knowledge economy is based on knowledge-intensive activities that contribute to scientific advances. It is argued by researchers that knowledge is a worthwhile strategic asset and one of the critical resources of firms (Khalique et al., 2013). With the shift towards a knowledge economy, the source of economic value is no longer limited to the production of tangible goods but also the creation of intangible assets (OECD, 1966). Due to this, today's economy is changing with the greater help of Intellectual Capital (IC). IC contributes to organisational growth more than other resources (Foray, 2004).

Although human knowledge is a critical asset across all sectors, its impact is pronounced more in the service sector. Among the service businesses, the banking industry is highly knowledge-intensive and operates in a highly dynamic and competitive environment (Mavridis, 2004). Further, due to their proximity to customers, bank employees are expected to be innovators (Githaiga, 2022). Thus, efficient utilisation of IC is critical for the success of a bank, and it is becoming a necessity to remain competitive in the Banking industry (Khalique et al., 2013, p. 77).

Numerous researches have been conducted on the impacts of IC on bank performance. Since the concept is versatile, dynamic, and contemporary, the research outcomes are mixed, inconclusive and unsettled (Bellucci et al., 2021; Faraji et al., 2022, p. 2). Some argue that such inconsistency is the result of unclear measurements of IC (Soewarno & Tjahjadi, 2020). However, many researchers found a positive association between IC and bank performance (Majumder et al., 2023; Akkas & Asutay, 2022; Githaiga, 2022; Mollah & Rouf, 2022) while others didn't find positive a correlation between bank performance and IC (Maditinos et al., 2011).

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This article is divided into six sections. The Second section covers the literature review. Section Three is devoted to the Ethiopian Banking sector. Methodology and data are presented in section Four. Sections Five and Six discuss the empirical results of the research and the conclusions of the study, respectively.

Literature Review

The Concept of Intellectual Capital

Although its root goes back to the period of Adam Smith (Angrist et al., 2019), the word "Intellectual Capital" (IC) came into academia in the 1960s in the application of the human behaviour process (Galbraith, 1967). The term has also numerous names such as "human capital", "resources embedded in people" (Angrist et al., 2019), "intangible assets" and "intangibles" (Bontis, 2001). Later, IC is identified as a driver of business performance (Edvinsson & Malone, 1997; Pulic, 2004). Now, IC is becoming a subject of information disclosure in business reports (Birindelli et al., 2020). Due to these, IC has become a vibrant topic in management and accounting research (Faraji et al., 2022).

Although the importance of IC is discussed in many articles, there is no agreed definition of the concept (El-Bannany, 2012). However, most authors agree that it is an intangible resource that encompasses knowledge, experience, management philosophy, brands, business culture, systems and human resources used to support the creation of corporate value (Edvinsson & Malone, 1997).

The value of IC is the aggregate sum of its components. Similar to its definition, however, the number and type of its components vary. Choong (2008) classified IC into Human Capital (HC), Structural Capital (SC), Customer Capital (CC) and Property Rights Capital (PRC). Pulic (2004) and Edvinsson (1997), on the other hand, grouped the IC parts into two: HC and SC. Other scholars extended the classification by increasing the number of variables (Mollah & Rouf, 2022; Majumder et al., 2023; Maji & Hussain, 2021; Vo & Tran, 2021; Hanif et al., 2019).

Despite the presence of multiple classifications, several researchers used the three-component classification: HC, SC and EC. Similarly, this article follows the three-component grouping as it is widely applied (Wisetsri et al., 2021, p. 1922). Descriptions of each component are given below:

Human Capital

Jin and Wang (2020) define human capital as the increased value of employees' skills, productivity and efficiency through training and skill development. According to Iazzolino et al. (2014), human capital is the amount of capital invested in the knowledge of workers.

The concept also includes tacit and explicit knowledge of employees (Buallay et al., 2019).

Structural Capital

Structural capital refers to the non-human intangible assets such as patents, databases, culture, routine processes, rules, formulas, policies, procedures, etc., (Khalique et al., 2011; Wasim-ul-Rehman et al., 2013); and the organisational philosophy related to the functioning of human capital (Yang & Lin, 2009). Structural capital is the knowledge of a firm that remains in business; and it is the firm's capacity to withstand internal and external challenges (Goh, 2005; Cabrita & Vaz, 2006).

Capital Employed

The term can be called "customer capital" or "relational capital" (RC) (Wisetsri et al., 2021). It is a measure of the longevity of service and facilitates the conversion of intellectual capital into market value (Bontis, 2002; Pouraghajan et al., 2013).

Intellectual Capital and Bank Performance

Banks are among the service sectors driven by human knowledge. Of all, human capital is a critical resource for banks (Yao et al., 2019). In addition, Shahzad et al. (2022) found that IC has the power to explain the relationship between Corporate Social Responsibility and a firm's performance (Lajili & Zeghal, 2005). Further, a resilient banking sector contributes to the stability of a financial system and the development of the economy (Athanasoglou et al., 2008; Vera-Gilces et al., 2020). Due to this, banking sector performance has a positive relationship with the economic development of a country (Graff, 2014).

So far, many methods of intellectual capital measurement have been designed and applied (Andriessen, 2004; Chan,

2009; Buallay et al., 2019). Among the proposed methods, the Value-Added Intellectual Coefficient (VAIC™) is widely used to measure bank performances (Pulic, 2000; Cabrita & Vaz, 2006; Mavridis, 2004; Mavridis & Kyrmizoglou, 2005). The model has been also applied to measure non-bank firm performances (Iazzolino et al., 2014; Chouaibi & Kouaib, 2015; Rehman et al., 2011; Chu et al., 2011).

The VAIC model has been employed to study bank performances in several countries such as in Australia (Joshi et al., 2010), the UK (El-Bannany, 2008), Greece (Mavridis & Kyrmizoglou, 2005), China (Zou & Huan, 2011), India (Kamath, 2007), Turkey (Nassar, 2018), Japan (Mavridis, 2004), Malaysia (Goh, 2005), Ghana (Alhassan & Asware, 2016), Uganda (Kamukama, 2013), Nigeria (Oko et al., 2018), Pakistan (Wisetsri et al., 2021), UAE (El-Bannany, 2012), Italy (Birindelli et al., 2020), the USA (Shahzad et al., 2022; Meles et al., 2016). The model has also been applied to compare Islamic and conventional banks (Hasan et al., 2017); public and private banks (Sharma & Mani, 2012); regional and across-country performances such as the Gulf Cooperation Council (GCC) countries (Buallay et al., 2019; Ousama et al., 2020; Akkas & Asutay, 2022), Baltic Countries (Berzkalnea and Zelgalve, 2014), BRICS countries (Rehman et al., 2021), China and Pakistan (Xu et al., 2022), and East African countries (Githaiga, 2022).

As documented by Joshi et al. (2010, p. 157), the VAIC™ model has several benefits. The model result can easily be understood; it can be employed for any firm size; it enhances the benefits of traditional financial reports; it is simple, easy to calculate and useful to compare different entities. It uses consistent inputs, and its data is publicly available. However, the accounting data problem (historical data) will have a spill over effect on the model outcome. Further, defining bank performance using three variables may increase the limitation of the model. Finally, bank performance measurement is difficult as there are many perspectives on bank inputs and efficiencies (Chatzoglou et al., 2010).

A large body of empirical evidence on measuring bank performances using the VAIC is available (Ovechkin et al., 2021; Buallay et al., 2020; Ousama et al., 2020). Nevertheless, most of these studies are conducted in the context of developed nations, while in fact; empirical evidence is very limited for emerging countries (VeraGilces et al., 2020). The author addressed this issue in the context of Ethiopia, one of the fastest-growing economies in Sub-Saharan Africa, with huge market potential and a protected banking sector.

Research Background

The Ethiopian Banking Sector

Ethiopia introduced a modern banking system in 1905. Since then, the sector has passed several ups and downs in its course of development. The nationalisation of private banks during the Socialist Regime skewered the banking sector's performance. Later, the banking business re-emerged in 1994 when the new Regime allowed the reestablishment of private banks. As of June 30, 2022, the total number of banks reached 25, two of which were government-owned (National Bank of Ethiopia (NBE), 2022) and three of the private banks were Islamic banks. All of these banks were operating in 8,994 branches (76% private bank branches). Despite more than a century of banking history, Ethiopian banks are young and 40% of them have less than 10 years of banking business experience (Table 1).

Table 1: Age Classification of Banks

Year of Establishment	*Gov.*	*Pvt.*	*Total*	*Aver. Year of Service up to 2022*
Before 1994	2	0	2	> 60 years
1994-2000	0	6	6	26.5
2001-2010	0	7	7	23.0
2011-2020	0	4	4	9.3
2021-2022	0	6	6	1.3
Total	2	23	25	

Source: National Bank of Ethiopia and bank's web site.

As of June 30, 2022[1], the total equity capital of the 25 banks was US$3.83 billion (59% for private banks). During the same year, the banks had US$ 6.7 (56% for private banks) billion and US$5.32 billion (55% for private banks) deposits, and loans and advances, respectively. The market share for private banks was around 55%.

According to the Groupe Speciale Mobile Association report (2023), Ethiopia has low levels of financial inclusion compared to its neighbours. Only about 50%

[1]National Bank of Ethiopia (NBE) data on 06/30/2022; Weighted average exchange rate: US$/Birr was Br. 51.9938

of the adult population has a bank account. Cognisant of this, the Government of Ethiopia plans to increase financial inclusion from 46% to 70% by 2025. Expanding the mobile money sector and opening the banking business to foreign investors will also increase banking efficiency and the financial inclusion of the Nation (Pohl, 2010). Recently, Ethio-Telecom, the state-owned mobile operator, launched a mobile money service, and Safaricom received a mobile money license in May 2023. So far, the banking business is not open to foreign operators. However, according to Reuters (May 2023), the Ethiopian Government is planning to issue up to five banking licenses for foreign investors in the next five years.

Research Objectives

The quest for bank performance continues to be the focus of IC research which has policy and practical implications (Faraji et al., 2022, p. 11). In this regard, no study examined the linkage between IC and bank performances in Ethiopia using VAIC. Based on the outcomes of this research, bank managers can evaluate their performance and establish benchmarks. Furthermore, the outcomes of the study will assist investors in making bank investment choices and bank investment strategies. The result will also help economic analysts design policies and strategies to improve bank efficiency and unlock the IC potential for value creation. Specifically, this study will reveal the level of performance of commercial banks; and understand the relationship between the attributes of IC and the performance of banks. Last but not least, the study is expected to highlight the current strength of human capital investment in banks and help to identify future policy needs.

Study Design and Methodology

The study applied the VAIC^{TM} model to analyse the IC performance of Ethiopian banks. Similar to earlier studies, the panel regression model is formulated to identify the impact of the IC on bank performance (Majumder et al., 2023; Akkas & Asutay, 2022; Ousama et al., 2020; Wisetsri et al., 2020; Jin & Wang, 2020; Soewarno & Tjahjadi, 2020).

Data, Sample and Sample Sizes

The research was based on secondary data collected from banks' annual reports and the NBE. Since all data were gathered from audited financial statements, it can be argued that the measurement is objective and verifiable (Joshi et al., 2010; Goh, 2005).

Although there were 25 banks in the research period, not all banks were considered for the study. One of these banks was a Government policy bank. From the remaining 24 banks, only those banks that have been operating for, at least, one business cycle, 5 years, were chosen. It is argued that the strength of an institution is associated with the length of stay in the industry (El-Bannany, 2012). Hence, one business cycle minimum cut-off period was taken as a criterion for the selection. Accordingly, 7 banks were reduced from 24 as they have less than 5 years of operation in the industry. Thus, analysis was made on the 17 banks of which one of them was Government owned. All Islamic banks were not selected as they had less than 5 years in operation. The 17 banks represent 73% of the industry equity capital and 95% of bank branches. Thus, sufficient coverage can be assumed from the sample selection.

The author did not find a specific standard as to how many years and the number of banks to be considered for such a study. In the literature survey, the sample bank-year ranges from 3 (e.g., Ousama et al., 2020) to 14 (e.g., Maji & Hussain, 2021) years. And the number of banks ranges from 13 (e.g., Joshi et al., 2010) to 127 (e.g., Githaiga, 2022). Accordingly, the number of bank-year observations ranges from 33 to 1270 bank-years. This article covers 6 years of data (2017–2022) and 17 banks with a total of 102 bank-year observations. Table 2 depicts the profile of sample banks at the end of 2022[2].

[2]The National Bank of Ethiopia weighted average exchange rate of Birr/US$ on 30 June 2022 was Br 51.9938 per US$.

Table 2: Sample Bank Profiles (June 2022)

No	Name of Bank	No of Branches	No of Staff	Total Asset ($ '000)	Total Equity ($ '000)	ROA	ROE
1	Abay Bank	286	6,990	782,699	112,640	2.29%	15.94%
2	Addis International Bank	91	1,060	207,492	41,796	3.20%	15.87%
3	Awash Bank	566	17,393	3,527,172	402,955	2.91%	25.49%
4	Berhan Bank	261	6,278	635,935	85,856	1.45%	10.72%
5	Bank of Abyssinia	608	9,677	2,874,409	273,421	2.17%	22.76%
6	Buna Bank	285	2,932	655,916	97,420	2.58%	17.40%
7	Commercial Bank of Ethiopia*	1824	39,801	22,242,181	1,045,003	1.66%	35.38%
8	Cooperative Bank of Oromia	469	6,547	2,204,221	217,565	1.78%	18.08%
9	Dashen Bank	454	12,406	2,253,039	276,580	2.48%	20.20%
10	Debub Global Bank	111	2,332	270,910	42,092	1.97%	12.66%
11	Enat Bank	88	978	330,982	49,863	1.83%	12.12%
12	Hibret Bank	383	4,971	1,296,487	139,389	1.62%	15.06%
13	Lion International Bank	276	4,189	634,169	73,736	0.82%	7.01%
14	Nib International Bank	381	7,578	1,182,666	156,086	2.18%	16.49%
15	Oromia (Int'l) Bank	316	8,090	1,000,119	84,625	2.31%	27.27%
16	Wegagen Bank	398	4,824	829,362	107,976	1.28%	9.82%
17	Zemen Bank	63	1,325	675,461	120,339	4.20%	23.59%

Source: NBE and Bank's Annual Reports (June 30, 2022) * Government-owned bank.

Computations: Author.

Variable Definitions

In addition to dependent and independent variables, the regression is designed to accommodate both macroeconomic and bank-specific control variables as described below:

Dependent Variables

Return on Asset (ROA) is used to measure the operational performance of banks. It is calculated by dividing after-tax income by the total assets.

Return on Equity (ROE) is a performance measure in relation to shareholders' equity. It is calculated by dividing after-tax income by the total shareholders' equity.

Independent Variable

Company Value Added (VA) is the difference between outputs and inputs in bank operations (Majumder et al., 2023; Akkas & Asutay, 2022). Outputs consist of all revenues (incomes) while inputs cover all operating and non-operating expenses excluding the human investment cost.

HC is associated with employees' tacit and explicit knowledge (Buallay et al., 2019, p. 675). The variable is proxied by the total costs of employees such as wages, salary, and benefits.

SC is defined as explicit knowledge that has been internalised by a bank. According to Pulic (2004), if firm value is generated from the sum of HC and SC, then, the difference between VA and HC will result in SC. Thus, SC = VA - HC.

Capital Employed (CE) or RC includes both the physical and human capital of a bank (Wisetsri et al., 2021). It is proxied by the book value of net assets.

VAIC^{TM} is, therefore, the sum of IC component coefficients. Individual coefficients can be computed using the following relationship:

$$\text{HCE (Human Capital Coefficient)} = \frac{\text{VA}}{\text{HC}} \quad \text{(a)}$$

$$\text{CEE (Capital Employed Coefficient)} = \frac{\text{CE}}{\text{VA}} \quad \text{(b)}$$

$$\text{SCE (Structural Capital Coefficient)} = \frac{\text{SC}}{\text{VA}} \quad \text{(c)}$$

Thus, $$\text{VAIC} = \text{HCE} + \text{SCE} + \text{CEE} \quad \text{(d)}$$

Control Variables-Bank Specific

Bank Size (SIZE). Size may influence financial performance. Accordingly, larger banks have capabilities and may enjoy economies of scale (Githaiga, 2022). Size is measured by taking the natural logarithm value of total assets. Similar applications can be found in Ghosh and Maji (2019), Maji and Hazarika (2018) and Tan (2016).

Bank Age (AGE). It is argued that older firms achieve better performance because of their experience in the market (El-Bannany, 2012). Further, their experience helps to gain a competitive advantage through the adoption of better systems, staff recruitment and operation strategies. This argument was also supported by the works of Soewarno and Tjahjadi (2020), and Akkas and Asutay (2022).

Bank Branch (BRAN). In an underdeveloped banking system, deposit is mobilised through bank branches which is also encouraged to expedite the speed of financial inclusion (Ergungor, 2010). In addition, branch expansion reduces search costs and reduces the cost of inefficiency (Harimaya & Kndo, 2016).

Control Variables-Macroeconomic

Gross Domestic Product (GDP). Financial development and economic growth have a positive relationship (Guru & Yadav, 2019); and GDP is found to correlate with VAIC (Phusavat, 2012). Thus, the annual GDP growth rate is used as a control variable. Similar applications can be found in Majumder et al. (2023) and Akkas and Asutay (2022).

Inflation (INF). The GDP deflator covers INF resulting from domestic products and services produced in an economy. Due to this, INF is included as a control variable (Majumder et al., 2023).

Regression Model

The panel regression model is used to study the impact of intellectual capital on the financial performance of banks. The method is also useful to reduce the statistical bias (Greene, 2019; Hsiao, 2007). In the model, ROA and ROE are used to measure the operational and financial performances of banks, respectively. Bank size, number of bank branches, and bank age are bank-specific control variables. To isolate the macroeconomic effects, GDP growth rate and INF are also added as control variables.

The following four models are designed to investigate the relationship between IC components and bank performance. Model (1) and Model (2) test the association between VAIC and bank performance. And Model (3) and Model (4) are designed to analyse the relationship between IC components and bank performance (Xu et al., 2022). Accordingly, the following models are formulated:

$$\text{Model 1: } ROA_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 BRAN_{i,t} + \beta_5 GDP_t + \beta_6 INF_t + \varepsilon_{i,t}$$

$$\text{Model 2: } ROE_{i,t} = \beta_0 + \beta_1 VAIC_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 AGE_{i,t} + \beta_4 BRAN_{i,t} + \beta_5 GDP_t + \beta_6 INF_t + \varepsilon_{i,t}$$

$$\text{Model 3: } ROA_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 SCE_{i,t} + \beta_3 CEE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 BRAN_{i,t} + \beta_7 GDP_t + \beta_8 INF_t + \varepsilon_{i,t}$$

$$\text{Model 4: } ROE_{i,t} = \beta_0 + \beta_1 HCE_{i,t} + \beta_2 SCE_{i,t} + \beta_3 CEE_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 AGE_{i,t} + \beta_6 BRAN_{i,t} + \beta_7 GDP_t + \beta_8 INF_t + \varepsilon_{i,t}$$

Where i represent the individual banks; t the year; β and ε are estimated coefficients and standard error of the models, respectively. In addition, ROA, ROE, VAIC, HCE, SCE, CEE, SISE, AGE, BRAN, GDP and INF, represent Return on Assets, Return on Equity, Value Added Intellectual Coefficient, Human Capital Efficiency, Structural Capital Efficiency, Capital Employed Efficiency, Bank Size, Bank Age, Bank Branch, Gross Domestic Product and Inflation, respectively.

Empirical Results

Descriptive Statistics

Descriptive statistics is presented in Table 3. The findings showed that VAIC has mean value of 2.95. This mean value is higher than the performances of Ghanaian Banks, 2.09 (Alhassan & Asare, 2016) and lower than East African Banks, 3.67 (Githaiga, 2022). The result also showed that VAIC caused most of the variances in the dependent variables.

Table 3: Descriptive Statistics

	ROA	*ROE*	*VAIC*	*HCE*	*CEE*	*SCE*	*BRAN*	*SISE*	*AGE*	*GDP*	*INF*
Mean	0.023	0.171	2.948	2.368	0.055	0.526	334	17.218	21.049	0.076	0.179
Median	0.022	0.167	2.867	2.251	0.054	0.556	264	17.211	17.000	0.070	0.157
Maximum	0.042	0.354	5.194	4.357	0.086	0.770	1,824	20.869	60.000	0.101	0.347
Minimum	0.003	0.025	(0.898)	0.427	0.016	(1.342)	16	14.541	11.000	0.061	0.067
Std. Dev.	0.007	0.048	0.909	0.711	0.013	0.239	339	1.189	11.580	0.016	0.089
Observations	102	102	102	102	102	102	102	102	102	102	102

Source: Author.

Further, the average value of ROA and ROE was found to be 0.023 and 0.171, respectively. Among the list, HCE is the most influential VAIC component with a mean value of 2.37, compared to SCE and CEE, with a mean value of 0.526 and 0.058, respectively.

Correlation Analysis

Table 4 presents a Pearson's Correlation matrix to evaluate the relationships between dependent and independent variables. As can be observed, VAIC has a significant and positive correlation with both ROA and ROE. And CEE has the highest correlation (72%), and HCE and SEE also have a statistically significant relationship with ROA (66%% and 55%, respectively). Similarly, a positive correlation is also found among VAIC components and ROE. The correlation coefficients are statistically significant at 5%.

Table 4: Pearson's Correlation Matrix

	ROA	ROE	VAIC	HCE	CEE	SCE	BRAN	SIZE	AGE	GDP	INF
ROA	1.000	0.503	0.671	0.659	0.723	0.551	(0.403)	(0.379)	(0.370)	0.076	(0.101)
ROE	0.503	1.000	0.488	0.452	0.321	0.493	0.380	0.405	0.319	(0.003)	0.009
VAIC	0.671	0.488	1.000	0.983	0.635	0.842	(0.125)	(0.094)	(0.034)	0.179	(0.182)
HCE	0.659	0.452	0.983	1.000	0.602	0.729	(0.130)	(0.092)	(0.020)	0.171	(0.177)
CEE	0.723	0.321	0.635	0.602	1.000	0.569	(0.347)	(0.283)	(0.356)	(0.034)	0.051
SCE	0.551	0.493	0.842	0.729	0.569	1.000	(0.067)	(0.069)	(0.050)	0.174	(0.170)
BRAN	(0.403)	0.380	(0.125)	(0.130)	(0.347)	(0.067)	1.000	0.911	0.900	(0.196)	0.229
SIZE	(0.379)	0.405	(0.094)	(0.092)	(0.283)	(0.069)	0.911	1.000	0.852	(0.317)	0.349
AGE	(0.370)	0.319	(0.034)	(0.020)	(0.356)	(0.050)	0.900	0.852	1.000	0.010	(0.021)
GDP	0.076	(0.003)	0.179	0.171	(0.034)	0.174	(0.196)	(0.317)	0.010	1.000	(0.797)
INF	(0.101)	0.009	(0.182)	(0.177)	0.051	(0.170)	0.229	0.349	(0.021)	(0.797)	1.000

Source: Author.

Since the correlation coefficients of explanatory variables are below 80%, there is no problem of co-linearity in the models (El-Bannany, 2007). In addition, the Variance Inflation Factor (VIF), was computed for further validation. Accordingly, an independent variable with more than 10 VIF value indicates the presence of multi-collinearity in the model (Wooldridge, 2005; Mohapatra et al., 2019). As shown in Table 5, the VIF value of all variables is less than 10; hence, there is no multi-collinearity problem in the models.

Table 5: Variance Inflation Factor (VIF)

	Model 1	*Model 2*	*Model 3*	*Model 4*
VAIC	1.15	1.11		
HCE			3.53	3.53
SCE			2.17	2.17
CEE			2.88	2.88
GDP	2.99	2.92	3.49	3.49
INF	4.80	4.31	6.89	6.89
SIZE	7.51	7.99	7.91	7.91
AGE	3.33	5.32	1.20	1.20
BRAN	4.75	6.33	3.54	3.54

Source: Author.

Model Validity Tests

As indicated above, the analysis of this article is based on panel data. Panel data captures samples of the same cross-sectional units observed at multiple points in time. That is, it has both cross-sectional (banks) and time (years of observation) dimensions.

Panel data regression model estimation can be applied using one of the three approaches. (a) Common Effect (Pooled Least Square) model assumes same firm behaviour across periods and for all cross-sections. Since bank samples vary in management style, age, asset size, capacity, etc., this approach is not suitable for our study. (b) Fixed Effect approach assumes that differences between cross-sections (banks) can be accommodated by setting different intercepts for cross-section differences. (c) Finally, Random Effect method is good where inference variables are interconnected between time and cross-sections.

In practice, the appropriate model choice is based on the statistical test results. Accordingly, the Chow test was applied to check if the pooled least square model is suitable to our data set. We found that in all models p-value is less than 0.05 (0.000, -0.003, 0.000 and -0.001 for Models 1, 2, 3 and 4, respectively) which rejects our pooled regression model choice. Then, the Hausman test is applied to choose between fixed and random effect models. Accordingly, p-value is found greater than 0.05 for model 1 and 2 and less than 0.05 for models 3 and 4. Hence, fixed effect is preferable for models 3 and 4 and not for model 1 and 2. Finally, the Breusch-Pagan test is applied to choose between common and random effect models. The rest result grants the use of the random effect models (p-value of 0.000 and -0.003 for Model 1 and 2, respectively) for model 1 and 2.

Multiple Regression Analysis

The results of the four models are depicted in Table 6. Accordingly, VAIC has a positive and significant relationship with bank performance measured by ROA and ROE. This aligns with the findings of various studies (Majumder et al., 2023; Akkas & Asutay, 2022; Mollah & Rouf, 2022; Maji & Hussain, 2021). On the other hand, due to the deposit mobilisation effect, the impact of the Branch is positive and significant in the case of Model 2. Further, Age has shown a negative and significant impact on ROE in model 2 which is in line with results of El-Bannany (2012), but contrary to the results of Soewarno and Tjahjadi (2020), and Akkas and Asutay (2022). According to El-Bannany (2012), the reason might be that older banks may rely more on previous success than younger banks do. However, GDP and inflation did not show any impact in both Model 1 and 2 which is contrary to the literature (Akkas & Asutay, 2021; Aslam & Haron, 2021; Mollah et al., 2017). In addition, size has shown no impact which is similar to the results of Azad *et al.*, (2012), but contrary to the findings of Akkas and Asutay (2021), Rehman et al. (2022); Soewarno and Tjahjadi (2020).

Table 6: Regression Output

	Model 1	*Model 2*	*Model 3*	*Model 4*
VAIC	0.0076*	0.0389*		
HCE			0.0056*	0.0310**
CEE			0.3801*	1.9446*
SCE			0.0000	0.0279
SIZE	(0.0017)	0.0104	(0.0007)	(0.0162)
BRAN	0.0000	0.0001*	0.0000	0.0002*

	Model 1	*Model 2*	*Model 3*	*Model 4*
AGE	(0.0002)	(0.0032)*	(0.0000)	(0.0007)
GDP	(0.0593)	(0.0209)	(0.0372)	(0.1270)
INF	0.0017	(0.1043)	(0.0071)	(0.0814)
	*P<0.05	**P<0.10		

Source: Author.

Further, the performance impact of HCE and CEE is positive and significant in both Models 3 and 4. Bank branch is found positive and significant in Model 4 as bank fund is mobilised through branches. Contrary to previous studies, however, bank size, GDP, and inflation do not show an impact (Aslam & Haron, 2021; Alipour, 2012). Generally, CEE has got greater impact on both ROA and ROE compared to other VAIC components.

Conclusions

In this study, the performance of the Ethiopian banking sector is analysed using the VAIC covering 17 banks over 6 years period. The bank performance is gauged using operational and financial performances. Generally, the VAIC has positive and significant impact on the performance of Ethiopian banks. And the relational capital (capital employed) has shown a significant influence among VAIC components.

Findings of the Study

According to this study, VAIC is positively related to the operational and financial performances of the Ethiopian banks; and it is found that the relational capital is a significant driver of ROE. Bank branch expansion has got a positive and significant impact on ROE due to its role as fund channelling. Since the Ethiopian banking industry is small, the impact of GDP and inflation was not observable.

Implications of the Study

First, the significant and positive relation between VAIC and bank performance indicates the need to consider intellectual capital as a strategic asset for Ethiopian Banks. To boost bank performance, therefore, investment in human capital is critical. Second, this study contributes to the empirical literature by exploring the impact of VAIC on bank performance in a protected banking industry. In this regard, the study will be used as a benchmark for future studies on VAIC when both foreign and domestic banks operate in the Ethiopian banking sector.

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