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Income diversification and bank risk-taking: The moderating role of intellectual capital

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Abstract: The purpose of this study was to investigate whether intellectual capital (IC) moderates the relationship between income diversification and bank risk-taking. Quantitative data were collected from 50 East African banking firms between 2010 and 2021, yielding 600 bank-year observations. Bank risk-taking is measured using Z-SCORE and non-performing loans (NPLs). The value added intellectual capital (VAIC) and its coefficients: human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency are used as proxy measures of IC. The system-generalized moment (GMM) was employed as the estimation model. According to the findings, banks with a higher non-interest income share take on excessive risk. Similarly, the findings show that VAIC, HCE, and CEE have a positive and statistically significant relationship with risk-taking. SCE, on the other hand, significantly reduces risk-taking. The findings also show that VAIC and its coefficients (HCE, SCE, and CEE) moderate the relationship between income diversification and risk-taking. These findings have implications for management and policy-makers. First, bank managers can use these findings to make strategic decisions about diversifying their income streams, mitigating associated risks, and determining how to best leverage IC to maximize profits. Second, regulators should increase oversight of non-lending activities by banks and, if necessary, impose regulatory ceilings. Furthermore, mandatory IC disclosure is required to uncover hidden bank value, which may inform risk management decisions among stakeholders. This is one of the first studies to provide empirical evidence of the relationship between income diversification and risk-taking in the East African region. Previous research on the relationship between income diversification and risk-taking has been contradictory; this paper adds to the body of knowledge by investigating whether IC moderates the relationship between income diversification and bank risk-taking.

Subjects: Finance; Banking; Business, Management and Accounting; Risk Management

Keywords: Income diversification; intellectual capital; risk-taking; East Africa; knowledge economy

PUBLIC INTEREST STATEMENT

Policymakers and management need to consider the implications of these findings. Intellectual capital performance and the overall risk exposure should be taken into consideration by bank management when evaluating income diversification strategies. There is a need for more regulatory oversight of non-lending activity.

1. Introduction

Following the Global Financial Crisis of 2008–2009, policymakers, practitioners, and scholars paid close attention to bank risk-taking (Danışoğlu et al., 2018; Edey, 2009; Ferrero-Ferrero et al., 2012). Banking crisis may cause a shortage of liquidity and a drop in stock market capitalization (Brunnermeier, 2009). Prior research attribute financial crisis to excessive banks' risk-taking and diversification into non-traditional banking activities (DeYoung & Torna, 2013; Abbas & Ali, 2022). However, some studies argue that corporate governance flaws may have contributed to the banking crisis (Conyon et al., 2011; Kirkpatrick, 2009). Consequently, banking regulators around the world begun policy reforms aimed at limiting the scope of non-traditional banking activities and strengthening the corporate governance mechanism. According to the Markowitz (1952) Portfolio Theory, income diversification may reduce risk exposure if non-interest revenue sources are not perfectly correlated with interest revenue. Banks, on the other hand, are at greater risk if their non-interest income is risky and positively correlated with their interest income streams. According to empirical evidence, income diversification can increase profits while also exposing banks to new risks (DeYoung & Roland, 2001). Previous research has also discovered that income diversification can result in cross-subsidization and cross-selling, which can improve lending business (Abedifar, Molyneux & Tarazi, 2019). Though the relationship between income diversification and bank risk taking has been examined previously; empirical literature shows mixed and contradictory results (Pennathur et al., 2012; Abedifar et al., 2018; Wang & Lin, 2021; M. Nguyen et al., 2012; Moudud-Ul-Huq, 2019; Nguyen, 2019). Because of the critical link between income diversification and risk-taking, as well as the inconsistency in the findings, it is critical to investigate whether this relationship can be influenced by moderating factors such as IC. According to Stewart (1997), IC denotes intellectual material that has been formalized, captured and leveraged to create wealth by producing higher-valued assets. While Roos and Roos (1997) define IC as "the sum of the 'hidden' assets of the company not fully captured on the balance sheet, and thus includes both what is in the heads of organizational members, and what is left in the company when they leave." Generally, IC is the summation of a firm's intangible and knowledge-based assets that create a competitive advantage and sustained superior performance.

Resource-based view theory holds that IC and other knowledge-based assets are critical drivers of successful diversification (Barney, 1991). A firm's diversification strategy, according to Neffke and Henning (2013), should focus on new business that necessitates the use of existing resources that the firm is currently underutilizing. Income diversification may aids in the leveraging of managerial skills and the creation of scope economies. These functional economies create operational synergy, which aids in operational risks management (Amihud & Lev, 1981). Furthermore, banks may use financial technology to diversify into fee-based activities, potentially lowering production costs while increasing product and service differentiation (Camisón & Villar-López, 2010). At the same time, the bank's reputation may help it enter new markets, such as nonlending activities, promoting the diversification process (Steenkamp & Kashyap, 2010).

Recent studies report a significant association between IC and diversification. Banks with high IC performance, according to Duho et al. (2019), have knowledgeable employees, sophisticated IT infrastructure, good internal processes, and critical market knowledge, which makes them more likely to venture into related products and services that will increase revenue. Banks with high IC, on the other hand, may choose to focus on lending while maintaining high quality, agility, and speed. Prior studies have also revealed that IC affects bank risk-taking (Dalwai et al., 2021; Ghosh & Maji, 2014; D. T. Nguyen et al., 2021). Cenciarelli et al. (2018) also found that IC reduces bankruptcy risks. At the same time, Asare et al. (2021) found that the components of intellectual capital efficiency (SCE and CEE) improve banks' asset quality.

Based on the empirical literature, just a few studies have examined the influence of intangible factors such as IC on the relationship between income diversification and bank risk-taking. Therefore, this study explores whether IC moderates the income diversification and bank risk-taking nexus. This study is highly significant because it emphasizes the need to appreciate intervening factors when evaluating the income diversification and risk-taking relationship. This study

differs from previous studies and contributes to the extant literature in two ways. First, most of the prior studies focused on banks in a single jurisdiction; this study uses a sample of banks drawn from several countries in the East African region, a developing region. Second, previous research concentrated on the direct link between income diversification and bank risk-taking. This study adds to the literature by investigating whether IC moderates the relationship between income diversification and risk-taking. The remaining sections of the paper are organized as follows: Section 2 discusses a review of previous studies. Section 4 describes the research methodology, including the sample, data, econometric model, and variable measurement. The empirical findings and discussion are presented in Section 4. Section 5 presents the study's conclusion, recommendations, and limitations.

2. Review of previous studies

2.1. Income diversification and risk-taking

Diversifying a bank's revenue streams can improve financial performance while also exposing the bank to new risks, market risk. The modern portfolio theory proposed by Markowitz in 1952 is helpful in explaining why banks diversify their sources of income. The theory contends that diversification increases business value and lowers risk in situations where asset returns are not completely correlated. Therefore, if their interest revenue is not perfectly correlated with non-interest income, banks may maximize returns. Risk management, efficiency, market dominance, managerial entrenchment, and resource exploitation are some other drivers of diversification (Chiorazzo et al., 2008; Elsas et al., 2010; Zamore, 2018). The general income diversification stance of bank is driven by several fundamental reasons.

Previous empirical studies on the relationship between income diversification and bank risk-taking found no agreement. Between 2002 and 2019, Abbas and Ali (2022) investigated the impact of income and funding diversification on the risk and stability of US commercial banks. According to the study's findings, while funding reduces bank risk, income diversification increases bank risk-taking. Zhou (2014) examined the relationship between income diversification and bank risk using a sample of 62 Chinese commercial banks and data from 1997 to 2012. The author found no link between income diversification and bank risk. Abedifar et al. (2018) investigated the impact of non-interest activities on bank lending. The authors analyzed quarterly data from 6921 US commercial banks from 2007:Q3 to 2016:Q3. According to the findings of this study, banks with a high share of non-interest activities have lower credit risk. Wang and Lin (2021) investigated the impact of income diversification on bank risk using a sample of 14 Asia Pacific economies from 2011 to 2016. They discovered that banks with a higher level of income diversification were less risky. M. Nguyen et al. (2012) investigated the link between bank market power, revenue diversification, and bank stability. The study employed data from 1998 to 2008, as well as a sample of 151 commercial banks from four South Asian countries (Bangladesh, India, Pakistan, and Sri Lanka). According to the study's findings, revenue diversification improved the stability of the banking sector. Using a sample of 1397 banks drawn from ten emerging economies between 2007 and 2015, Moudud-Ul-Huq (2019) concluded that revenue diversification improved bank performance and reduced overall risk. Nguyen (2019) examined the relationship between revenue diversification, risk, and bank performance of Vietnamese commercial banks using a sample of 26 commercial banks listed and unlisted in Vietnam from 2010 to 2018. Among other findings, the study found a positive relationship between revenue diversification and risk-taking in Vietnamese commercial banks. Based on the findings, the author concluded that increasing non-traditional sources of income increases the operational risk of banks. Furthermore, Le and McMillan (2021) investigated the effect of geographic expansion and income diversification on bank stability (as measured by the z-score in Vietnam using panel data from 2006 to 2015. The author discovered that, while geographic expansion improved bank stability, income diversification had the opposite effect. Thus, this study adds to the existing empirical literature by investigating the following hypothesis:

Hypothesis 1: There is a negative association between income diversification and bank risk-taking.

2.2. Intellectual capital and risk-taking

Although IC has been around for a while, existing literature indicates that there is still no consensus on its definition (Sharabati et al., 2013). Stewart (1997) defines IC as the total stock of collective knowledge, information, technologies, intellectual property rights, experience, learning and competence, team communication systems, customer relations, and brands that contribute to the value of a business. In general, intellectual capital (IC) refers to a company's accumulated knowledge, experiences, intangible assets, good relationships, know-how, and innovation, which enable it to achieve long-term competitive advantages and higher profits (Clarke et al., 2011). Because of the nature of their services, the banking sector is considered an IC-intensive sector (Branco et al., 2011). Therefore, IC generation and recognition is a critical strategic decision-making process for banks. According to Wernerfelt (1984), a company can improve its performance and gain a competitive advantage by acquiring, holding, and utilizing resources, or strategic assets. Resources, which include both tangible and intangible assets like IC, are used to implement specific competitive and successful strategies (Riahi-Belkaoui, 2003). Based on a resource-based perspective, IC investments are critical in services-oriented industries such as banking and help to increase efficiency and profitability. According to the theory, a bank must be able to acquire and/or control its valuable resources in order to gain a competitive advantage and invariably produce positive benefits such as lower credit risk and stability (Barney, 2001). One of the theory's main proponents, Wernerfelt (1984), underscored the importance of a firm's IC in pursuing firm profitability and growth.

IC is made up of three components: human capital, structural capital, and relational capital (customer capital). Dzinkowski (2000) and Radaelli et al. (2011) view human capital as the pool of an employee's skills, knowledge, innovation, and capabilities that they use to add value to organizations. The structural capital of a company is the total value of its patents, trademarks, hardware, software, databases, organizational culture, and organizational capabilities (Edvinsson & Malone, 1997). In contrast, relational capital refers to all resources associated with a company's external relationships with customers, suppliers, or R&D partners (Flöstrand & Zambon, 2006).

Traditionally, Pulic's (1998) value-added intellectual capital (VAIC) is used to measure IC performance. VAIC assesses a company's ability to generate value for its stakeholders by utilizing its physical, financial and intellectual capital. The VAIC index combines three efficiencies: HCE, structural capital efficiency, and capital employed efficiency (physical and financial capital efficiency). The empirical literature on the effect of VAIC on bank risk-taking is limited, and existing empirical studies yield contradictory results.

Curado, Guedes and Bontis (2014) examined the impact of IC on bank financial performance using a sample of 11 Portuguese banks from 2005–2006 (pre-crisis), 2007–2008 (during the crisis) and 2009–10 (post-crisis). According to the study's findings, banks with low IC scores are more likely to fail. Ullah et al. (2021) investigated the impact of VAIC on bank stability. From 2008 to 2018, the authors used a sample of 17 commercial banks in Pakistan. This study's findings show that ICE improves bank stability, which is consistent with the resource-based theory.

In the Saudi banking industry, Alrashidi and Alarfaj (2020) investigated the impact of VAIC and its dimensions on bank credit and insolvency risks. The study examined a sample of 11 Saudi listed banks from 2009 to 2018. The findings indicate a significant inverse relationship between VAIC (HCE and SCE) and bank insolvency risks. Dalwai et al. (2021) investigated the link between IC, bank stability, and risk-taking. This study's findings show no link between IC efficiency and bank risk-taking. Zheng et al. (2022) investigated the effect of VAIC on bank risk-taking in Bangladesh. A sample of 32 commercial banks and data from 2003 to 2020 were used. According to this study, VAIC was significantly and positively associated with credit risk. Correspondingly, both human

capital efficiency and structural capital efficiency had a positive and significant impact on credit risk; however, the impact of SCE was not as significant as that of HCE.

Asare et al. (2021) investigated the impact of IC on asset quality (measured as the ratio of non-performing loans to gross loans and advances) using panel data drawn from 24 banks from 2006 to 2015. According to the study's findings, IC had no effect on asset quality. The components of IC, on the other hand, produced mixed results; while structural capital and human capital efficiencies improved asset quality, capital employed efficiencies did not. Ghosh and Maji (2014) investigated the impact of VAIC and its components (human capital efficiency and structural capital efficiency) on credit and insolvency risks in Indian commercial banks from 1998 to 2012. The study discovered that IC was negatively related to credit risk. In terms of VAIC coefficients, only HCE had a significantly negative effect on credit risk. Using a sample of 28,915 firm-year observations drawn from US public companies from 1985 to 2015, Cenciarelli et al. (2018) found that IC performance reduces the probability of bankruptcy; however, the effect of SCE was statistically insignificant. Thus, the following relationship is hypothesized between IC and bank risk-taking.

Hypothesis 2: There is a negative association between VAIC and bank risk-taking.

H2A: There is a negative association between HCE and bank risk-taking.

H2B: There is a negative association between SCE and bank risk-taking.

H2C: There is a negative association between CEE and bank risk-taking.

2.3. The moderator effect of IC on the relationship between income diversification and bank risk-taking

Consistent with Barney's (1991) resource-based view of the firm, IC is a strategic asset capable of generating long-term value, superior financial performance, and sustainable competitive advantage (Alvino et al., 2020; Kamukama & Sulait, 2017). IC is a firm-specific asset that is neither imitable nor marketable. Firms can then combine IC with tangible resources to gain a long-term sustainable competitive advantage (Zambon, 2003). The importance of IC in achieving strategic goals such as diversification was emphasized by Lerro et al. (2014). According to the authors, "IC represents intrinsic objects of a company's strategy as well as an instrumental lever to achieve strategic outcomes." Cabrita and Vaz (2006) also stated "from a strategic standpoint, IC is used to create and apply knowledge to enhance firm value." This implies that IC contributes to firm value and is central to strategic decision making.

Alcaniz et al. (2011) propose that IC and strategy have a two-way relationship. They write, "Intellectual capital resources are often performance drivers; thus, there is a causal relationship between those resources and value creation." Several other studies have confirmed the importance of IC as the primary driver of an organization's value (Green & Ryan, 2005; Marr et al., 2004; Rylander & Peppard, 2003). As a result, the success of a firm's diversification strategy is likely to be influenced by its IC performance. Earlier research studies provide empirical evidence that IC leads to superior financial performance (Chatterjee et al., 2021; Mention & Bontis, 2013; Rehman et al., 2022; Vo & Tran, 2021). Several studies have also been conducted to determine whether IC affects bank risk and stability by deviating from the link between IC and bank performance. According to Dalwai et al. (2021), human capital efficiency (HCE) has a negative coefficient for bank risk-taking; however, VAIC has no relationship with bank risk-taking and stability. Similarly, in their study of the relationship between IC and risk-taking among Vietnamese banks, D. T. Nguyen et al. (2021) discovered an inverse U-shaped relationship between IC and bank risk-taking. According to the author, an initial investment in IC may increase risk; however, the risks will gradually stabilize in the long run. Similarly, Ghosh and Maji (2014) discovered that IC was negatively related to credit risk; the authors used panel data from 1998 to 2012 and a sample of 41 Indian commercial banks

(21 from the public and 20 from the private sectors). Guimón (2005) investigated the impact of IC reporting on credit risk and discovered that IC reports are critical for credit risk analysts and may ultimately positively influence credit decisions. Using data from 51 publicly traded Egyptian firms from 2014 to 2016, Shahwan and Habib (2020) discovered that IC efficiency was negatively related to the likelihood of financial distress. Similarly, Cenciarelli et al. (2018) found that IC performance could be used to predict bankruptcy.

There is also empirical evidence that IC and diversification have a significant relationship. According to Duho et al. (2019), IC influences diversification strategy selection. According to the author, banks with high IC performance tend to specialize in lending. Adesina (2021) recently found that increased human capital efficiency mitigated the negative impact of diversification on bank performance using a sample of 400 commercial banks representing 34 African countries from 2005 to 2015. Credit risks have an inverse relationship, according to Ghosh and Maji (2014). Alrashidi and Alarfaj (2020) found a negative link between ICE efficiencies (HCE and SCE) and bank insolvency risks in Saudi banking. From a macroeconomic perspective, Lashitew et al. (2021) note that improving IC performance enhances diversification and increases a country's capacity to create new technologies or the absorptive capacity to assimilate imported technologies. Therefore, highly income-diversified banks are more likely to leverage IC in mitigating credit risks. As a result, the study's subsequent hypotheses are as follows;

Hypothesis 3: VAIC moderates the relationship between income diversification and bank risk-taking.

H3A: HCE moderates the relationship between income diversification and bank risk-taking.

H3B: SCE moderates the relationship between income diversification and bank risk-taking.

H3C: CEE moderates the relationship between income diversification and bank risk-taking.

3. Methodology

3.1. Sample and data

The study focuses on the moderating effect of IC on the relationship between income diversification and bank risk-taking in East African countries. The initial population consisted of 127 commercial banks from five East African countries, with complete information from 2010 to 2021: Kenya 42, Tanzania 38, Uganda 26, Rwanda 11, and Burundi 11. After screening for missing data, the final sample included data from 50 banks for a period of 12 years, yielding 600 bank-year observations. All the data were obtained from each bank's annual audited financial reports. Table 1 contains a detailed variable description as well as additional information on selected variables.

3.2. Measurement of variables

3.2.1. Bank risk-taking

Following prior studies on bank risk-taking (Adu, 2022; Hunjra et al., 2021; Wang & Lin, 2021), the study uses z-score as the proxy measure of bank riskiness. The z-score is calculated as shown below.

$$Z - SCORE = \frac{(ROA + CAR)}{\sigma(\mathrm{ROA})}$$

ROA stands for annual return on assets, CAR stands for capital-to-assets ratio, and (ROA) stands for standard deviation of annual asset returns. A higher Z-score indicates that the bank takes fewer risks because the z-score has a return measure in the numerator and a risk measure in the

denominator (Boungou, 2020). In all regression models, z-score is log-transformed to reduce the possibility of skewness in its distribution, which may affect the accuracy of the results. The study then uses non-performing loans to assess bank risk-taking (NPLs). NPL is an indicator of credit risk and is regarded as the primary source of banking risk as an accounting-based risk measure (Kasman & Kasman, 2015). The NPLs to total loan ratio is a proxy for NPLs (Saif-Alyousfi et al., 2020).

3.2.2. Income diversification

Income diversification is the predictor variable. The Herfindahl-Hirschman Index (HHI) is used as a measure of income diversification (Chiorazzo et al., 2008; Meslier et al., 2014). The HHI index is constructed in the manner shown below.

$$HHI = \left[\left\{\left(\frac{NON}{NOI}\right)^2 + \left(\frac{NII}{NOI}\right)^2\right\}\right]$$

Where NON stands for non-interest income, NII stands for net interest income, and NOI is the sum of NON and NII. The HHI scale ranges from 0.0 to 1.0, which means that as the HHI increases, the bank becomes less diverse and more focused on lending. As a result, the degree of income diversification is computed as follows:

$$Income\ Diversification\ (DIV) = 1 - \left[\left\{\left(\frac{NON}{NOI}\right)^2 + \left(\frac{NII}{NOI}\right)^2\right\}\right]$$

3.2.3. Intellectual capital measures

The moderator variable is denoted by the symbol IC and is measured by the VAIC™. Despite its dominance in the quantitative intellectual capital literature, the VAIC™ has received criticism. Critics have claimed that the results are based on flawed assumptions (Ståhle et al., 2011). Regardless, the model has gained popularity due to a number of strengths. First, the financial data used are audited and thus unbiased; second, the use of financial statement line items makes it as useful as the financial statements; and third, it is simple to comprehend and compute (Clarke et al., 2011). Since its inception in 1998, the VAIC™ has remained a simple method of calculating IC performance. Given that no other model has achieved the same level of rigor and mathematical resilience as VAIC™, the current study uses the model as a proxy for IC (Mollah & Rouf, 2022; Nawaz & Ohlrogge, 2022; Weqar et al., 2021; Yousaf, 2021). Pulic's (2000) value-added intellectual capital (VAIC) has three coefficients: human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CEE). HCE measures the effectiveness of human capital, while SCE indicates how much of the company's value creation is generated by structural capital. CEE denotes the value created for each monetary unit invested in financial or physical capital. VAIC and its efficiencies are calculated as follows:

$$VAIC_i = HCE_i + SCE_i + CEE_i$$

Where; VAIC™ = VA is the intellectual capital coefficient; HCE = human capital efficiency; SCE = structural capital efficiency, and CEE = capital employed efficiency. VA is the sum of operating profit (OP), employee costs, depreciation, and amortization expenses. HCE is calculated by dividing the VA by the total employee costs or payroll expenditure (staff salaries, pension, insurance, and related expenses).

$$HCE_I = \frac{VA_i}{HC_I}$$

SCE is calculated by dividing the SC by the VA (SC/VA), where SC is calculated by subtracting the value of HC from VA (VA–HC).

$$\frac{SC_i}{VA_i} = \frac{VA_i - HC_i}{VA_i}$$

CEE is obtained by dividing its VA by the book value of the net assets.

$$CEE_i = \frac{SC_i}{VA_i}$$

3.2.4. Bank control variables

The study control for bank-specific factors known to influence bank risk-taking to isolate the effect of income diversification and IC on bank risk-taking activities. Prior research indicates that leverage (LEV), bank size (BS), and liquidity (LIQ) are all related to risk activities (Hunjra et al., 2020). According to Ehsan and Javid (2018), highly leveraged banks are more likely to take risks due to borrowed funds. According to Ullah et al. (2021), leverage is defined as the ratio of total liabilities to total assets.

Empirical literature reveals that better capitalized tend to be more efficient and are less exposed to credit risk; thus demonstrate greater financial stability (Dahir et al., 2018; López-Penabad et al., 2022). Shareholders of a poorly capitalized bank prefer riskier investments because they stand to lose little if the bank fails, implying that riskier assets maximize their wealth. Shareholders in a well-capitalized bank, on the other hand, prefer lower-risk investments because they stand to lose more if the bank fails (Jeitschko & Jeung, 2005). This case demonstrates how capital adequacy regulations can be used to align a bank's risk tolerance and capitalization. The equity-to-total-assets ratio is used to calculate capitalization in the study (López-Penabad et al., 2022). The "too-big-to-fail hypothesis" explains why size matters in determining bank risk-taking (Soedarmono et al., 2013). However, empirical studies produce contradictory results. For example, Uddin et al. (2020) discovered a positive relationship between bank size and z-score, but a negative relationship between size and net interest income margin volatility. Soedarmono et al. (2013) observed no relationship between bank size and risk-taking. Smaller banks, according to Bikker and Vervliet (2018), may be more willing to take higher risks in order to expand. Following Boungou (2020), bank size is measured as the logarithm of total assets. The study also controlled for liquidity, is an indicator of the proportion of assets tied up in loans. A study by Danisman and Demirel (2019) reported a positive association between liquidity and credit risks. The proxy measure for liquidity is the ratio of loans to assets (Danisman & Demirel, 2019).

3.3. Research model

Stepwise regression was used to examine the moderating effect of IC on the relationship between income diversification (DIV) and bank risk-taking (BRT). The study employed the two-step system GMM estimation regression to test the hypotheses. For several reasons, this methodology is critical to the robustness of the empirical analysis results (Hansen, 1982; Arellano & Bond, 1991). First, we can use panel data regression to account for firm heterogeneity. Second, the two-step system GMM technique is a dynamic model that employs lagged variables as instruments to provide a consistent and efficient estimator to address potential model endogeneity issues. The estimation models are shown in panels A and B. Panel A investigates the role of VAIC in moderating the relationship between DIV and BRT. Panel B examines the moderating effect of the VAIC coefficients (HCE, SCE, and CEE) on the DIV-BRT nexus. The econometric equations are illustrated below, with variable definitions provided in Table 1.

Panel A:

$$BRT_{it}=\beta_0+\beta_1 DIV_t+\beta_2 VAIC_{it}+\beta_3 DIV^{*}VAIC+\beta_z Controls_{it}+\varepsilon_{it}$$

Panel B:

$$BRT_{it}=\beta_0+\beta_1 DIV_{it}+\beta_2 HCE_{it}+\beta_3 SCE_{it}+\beta_4 CEE_{it}+\beta_5 DIV^{*}HCE+\beta_6 DIV^{*}SCE+\beta_7 DIV^{*}SCE+\beta_z Controls_{it}+\varepsilon_{it}$$

4. Findings and discussion

4.1. Descriptive statistics

The descriptive statistics for the variables used in the research study are shown in Table 1. The average z-score for the sample was around 8.984, with a range of 0.104–49.40, implying that East African banks are generally financially stable. The standard deviation of 5.622 indicates that risk-taking varies significantly among East African banks. NPLs had a mean of 0.103 and a range of 0.002–0.489. The standard deviation of 0.094 indicates that there is a significant difference in the average level of NPLs among the banks studied. DIV was 0.391 on average, with values ranging from 0.027–0.498. The average income diversification of 0.391 indicates that banks engage in nonlending activities in a moderate manner, implying that they are more focused on financial intermediation. The VAIC average was 4.169, with a range of 0.651–12.367. The HCE average was 3.425, with a range of 0.263–111.713. The SCE average was 0.656, with a range of 0.162–0.916. The CEE mean was 0.287, with a range of 0.036–0.534. The CAR average was 0.159, with a range of −0.356 to 0.854. The average LEV was 0.838, with a range of 0.222–928. The LIQ average was 0.578, with a range of 0.237–0.945. The average bank size was 11.023, with a range of 9.316–12.945.

4.2. Correlation analysis

The study examines the association between the dependent and other research variables using Pearson's pairwise correlation, before running the regression models. Table 2 displays the correlation coefficients. Table 2 shows that the correlation between Z-SCORE and NPLs is negative and significant, implying that NPLs have an adverse effect on bank stability. The correlation between DIV and Z-SCORE is negative and significant, which means that banks with a high concentration of fee-based activities are taking excessive risks. VAIC, HCE, and CEE all have a significant and positive correlation with the Z-SCORE. The Z-SCORE has a significant positive correlation with CAR and LIQ. The correlation between LEV, BS and Z-SCORE is negative and significant. VAIC has a positive relationship with its coefficients because it is the sum of their values. Evidently, VAIC has a strong and positive relationship with its two main dimensions (HCE and SCE). The predictor variables are unaffected by multicollinearity because the explanatory power of VAIC and the

Table 1. Descriptive statistics

Variable	N	Mean	p50	Std. Dev.	Min	Max
Z-SCORE	600	8.984	8.623	5.622	0.104	49.402
NPLs	600	0.103	0.076	0.094	0.002	0.489
DIV	600	0.391	0.410	0.091	0.027	0.500
VAIC	600	4.169	3.935	1.562	0.6513	12.367
HCE	600	3.425	3.167	1.475	0.263	11.713
SCE	600	0.656	0.679	0.133	0.162	0.916
CEE	600	0.287	0.288	0.062	0.036	0.534
CAR	600	0.159	0.150	0.075	−0.356	0.854
LEV	600	0.838	0.854	0.097	0.222	0.928
LIQ	600	0.578	0.589	0.120	0.237	0.945
BS	600	11.023	11.047	0.777	9.316	12.945

This table shows descriptive statistics of the variables included in the model, as specified in Equation (1). The sample period stretches from 2010 to 2021. A high-value Z-SCORE denotes financial stability and moderate risk-taking. NPLs is the ratio of non-performing loans to total loans. A large value of NPLs denotes higher credit risks. Income diversification (DIV) is measured using the Herfindahl-Hirschman Index (HHI). Intellectual capital measure ("VAIC") and its components ("CEE," "HCE," and "SCE") are calculated following public. The capital to asset ratio (CAR) is the ratio of shareholders' funds to assets. Liquidity (LIQ) is calculated as the ratio of loans to assets. Leverage (LEV) is computed as total liabilities on total assets. Bank size (BS) is measured as the logarithm of total assets. All the data were extracted from annual reports.

Table 2. Pearson pairwise correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Z-SCORE	1.00										
(2) NPLs	−0.45*	1.00									
(3)VAIC	−0.22*	0.13*	1.00								
(4) HCE	−0.26*	0.37*	0.97*	1.00							
(5) SCE	0.33*	−0.38*	0.63*	0.57*	1.00						
(6) CEE	−0.13*	0.06	0.36*	0.35*	0.17*	1.00					
(7) DIV	−0.12*	0.12*	0.14*	0.14*	−0.04	0.28*	1.00				
(8) CAR	0.60*	−0.17*	0.04	0.03	0.13*	0.01	−0.07	1.00			
(9) LIQ	0.25*	0.23*	−0.09*	−0.09*	−0.05	−0.02	−0.16*	0.10*	1.00		
(10) BS	−0.13*	0.07	−0.04	0.10*	0.04	−0.15*	0.04	0.09*	−0.12*	1.00	
(11) LEV	− 0.47*	0.18*	0.16*	0.17*	−0.04	0.09*	0.07	−0.41*	0.09*	−0.057	1.00

Definition of variables is given in Table 1; * means variable significant at 5% level

coefficients is tested in separate regression models. Table 2 shows that there is no multicollinearity because the correlation coefficients are less than 0.9. (Haniffa & Cooke, 2002; Tabachnick & Fidell, 1996)

4.3. Regression results

The SGMM regression results are used in the study to test the hypotheses. The SGMM approach is used because it addresses the endogeneity issue. For the results of SGMM to be valid, two conditions must be met. First, there should be no second-order autocorrelation in the model. The SGMM specification tests, AR1 and AR2, satisfy the condition that there is first order autocorrelation but no second order, which is required in GMM (Arellano & Bond, 1991; Roodman, 2009). Simultaneously, the Hansen tests of overidentification restrictions the null hypothesis that "the instrumental variables are uncorrelated to the residuals" cannot be rejected. Therefore, the instruments are exogenous and confirm the validity of the GMM model.

Model 1 of Panel A in Table 3 tested the direct causal relationship between the control variable and bank risk-taking (measured by Z-SCORE). The results show the effect of capital to assets ratio (CAR) on Z-SCORE is positive and significant ($\beta = 0.761$; $p < 0.05$). The results indicate that banks with a higher capital-to-asset ratio are more financially stable and assume fewer risks. Prior studies have also argued that banks' shareholders attach more importance to their wealth at risk (Kim & Santomero, 1994; Laeven & Levine, 2009). Liquidity is positively and significantly associated with the Z-SCORE ($\beta = 0.554$; $p < 0.05$), indicating that highly liquid firms are more financially stable and take fewer risks. Conversely, leverage had a significantly negative relationship with the Z-SCORE ($\beta = -0.749$; $p < 0.05$), suggesting that banks with lower financial debt take lower risks and are financially stable compared with those with high debt levels and the findings are consistent with Agustia et al. (2020) who studied Indonesian listed companies. The effect of bank size on Z-SCORE was negative and significant ($\beta = -0.149$; $p < 0.05$). The results are consistent with Bhagat et al. (2015) but contradict Dalwai et al. (2021) found no association among Oman's non-financial sector companies. Based on the "too big to fail hypothesis," large banks have a high

Table 3. System GMM regression results- Panel A

Z-SCORE	Model 1	Model 2	Model 3	Model 4
CONSTANT	2.267(0.380)**	2.774(0.419)**	3.293(0.406)**	3.741(0.399)**
Controls				
CAR	.761(0.125)**	.783(0.118)**	.781(0.119)**	.568(0.134)**
LEV	−.749(0.077)**	−.730 (0.078)**	−.678(0.074)**	−.603(0.073)**
LIQ	.554(0.107)**	.568(0.107)**	.524(0.101)**	.566(0.100)**
BS	−.149(0.033)**	−.184(0.035)**	−.209(0.034)**	−.205(0.033)**
Independent variable				
DIV		−.384 (0.129)**	−.289 (0.123)**	−.598 (0.131)**
Moderator				
VAIC			−.050(0.009)**	−.042 (0.008)**
Interaction effect				
DIV*VAIC				−.380(0.073)**
Instruments	60	61	62	63
Post estimation tests				
AR(1)	0.000	0.000	0.000	0.001
AR(2)	0.273	0.255	0.218	0.315
Hansen	0.077	0.103	0.262	0.260

This table shows the estimated from dynamic panel-data estimation with two-step system GMM: Model 1, Z-SCORE and control variables; Model 2, DIV is added; Model 3, VAIC is added; Model 4, the interaction between DIV and VAIC is added. Standard errors are in parentheses; **p < 0.05.

propensity to assume excessive risks to improve profitability; thus, they are likely to be financially unstable.

Model 2 displays the bank risk-taking variable (z-score) regression on the income diversification (DIV) and the control variables. The results show a negative association between ID and z-score ($\beta = -0.384$; $p < 0.05$). Based on the findings, Hypothesis H1 is accepted, and the study reveals that more income-diversified banks take excessive risks and are more likely to be financially unstable. The findings agree with those of Le and McMillan (2021). These findings can be attributed to the following three reasons. First, shifting towards non-traditional activities may necessitate banks to increase their investments in technologies and human capital, increasing operating leverage and consequently leading to earnings volatility. Second, fee-based activities can increase financial leverage, which is associated with income volatility. Altogether, these may reduce bank stability. Finally, a lack of expertise in nonlending activities leads to losing focus and ineffective monitoring of loans- ultimately swelling NPLs. The results are consistent with studies that reported a diversification discount (Duho et al., 2019; Githaiga, 2022). However, they contradict Markowitz's (1952) modern portfolio theory suggests that income diversification reduces risks and improves profitability since non-interest income is not perfectly correlated with traditional interest income.

The beta coefficient of VAIC and Z-SCORE is negative and significant at the 5per cent level ($\beta = -0.050$; $p < 0.05$) and hypothesis 2 is accepted. The results disagree with Dalwai et al. (2021), who reported no association between VAIC and bank risk-taking. Based on these findings, banks with high IC performance tend to take excessive risks to leverage intangible assets for competitive advantage and higher returns. Excessive expansion in noninterest earning activities, combined with overinvestment in IC, may increase a bank's operating and earnings volatility.

Table 4 presents the regression results for Z-SCORE on income diversification and VAIC coefficients. The effect of HCE on Z-SCORE is negative and significant ($\beta = -0.059$; $p < 0.05$); therefore, H2A is accepted. The findings contradict Onumah and Duho (2019), who found a positive and significant association between HCE and Z-SCORE and Ghosh and Maji (2014) reported an insignificant relationship. Human capital is the heart of lending activities and credit management. Credit officers' skills, knowledge and experience are key in appraising and monitoring loans and other advances. However, the findings reveal that over-investing in HCE may make a bank overconfident and take excessive risks exposing them to insolvency risks. For instance, frequent and concentrated experience in lending leads to greater familiarity, lower perception of risk and poor appraisal of applicants, thus exposing the bank to higher credit risks. In the same way, for human capital to positively influence organizational outcomes, bank managers should continually invest in specific training areas to enhance employees' efficiency in lending activities. Hence, the negative relationship between HCE and financial stability is more likely to reverse in the long run. SCE has a positive and significant effect on Z-SCORE ($\beta = 0.568$; $p < 0.05$) and H2B is rejected.

However, the findings are inconsistent with Ghosh and Maji (2014) and Onumah and Duho (2019), who found a negative and insignificant effect. The results suggest that structural capital dimensions (organizational culture, systems, policies, procedures, and structures) are positive drivers of bank stability. Banks with a high SCE take less risk and have a low probability of being insolvent. CEE has a negative and significant effect on Z-SCORE ($\beta = -0.939$; $p < 0.05$). H2C is accepted and the results are consistent with Onumah and Duho (2019). From the findings, an increase in financial capital leads to excessive risk-taking among commercial banks, which lowers a bank's stability. Thus, an attempt by shareholders to create value by injecting more financial capital will lead to excessive risk-taking, exposing the bank to insolvency risks and ultimately undermining the industry's financial stability.

The results for the moderating effect of VAIC on the relationship between income diversification and Z-SCORE are presented in Model 4. The interaction between DIV and VAIC was used to test hypothesis 3. As reported in Model 4, the beta coefficient of DIV*VAIC is negative and significant

Table 4. System GMM regression results—Panel B

Z-SCORE	Model 5	Model 6	Model 7	Model 8
CONSTANT	3.302(0.397)**	3.593(0.388)**	3.063(0.373)**	3.100(0.369)**
Controls				
CAR	.898(0.116)**	.911(0.112)**	.910(0.106)**	.928(0.105)**
LEV	−.634(0.070)**	−.591(0.069)**	−.571(0.065)**	−.588(0.065)**
LIQ	.516(0.097)**	.477(0.095)**	.480(0.089)**	.502(0.089)**
BS	−.220(0.032)**	−.232(0.031)**	−.198(0.030)**	−.197(0.030)**
Independent variables				
DIV	−.304(0.116)**	−.516(0.120)**	−.415(0.115)**	−.392(0.114)**
Moderators				
HCE	−.059(0.011)**	−.046(0.011)**	−.045(0.011)**	−.034(0.012)**
SCE	.568(0.111)**	.399(0.114)**	.434(0.107)**	.364(0.110)**
CEE	−.939(0.226)**	−.868(0.219)**	−.557(0,213)**	−.722(0.219)**
Interaction effects				
*DIV*HCE*		−.344(0.076)**	−.241(0.074)**	−.192(0.074)**
*DIV*SCE*			.190(0.030)**	.164(0.032)
*DIV*CEE*				−.191(0.069)**
Instruments	64	65	66	67
Post estimation tests				
AR(1)	0.000	0.000	0.003	0.000
AR(2)	0.347	0.367	0.402	0.418
Hansen	0.256	0.314	0.190	0.143

This table shows the estimated from dynamic panel-data estimation with two-step system GMM: Model 5, Z-SCORE, DIV, VAIC coefficients (HCE, SCE and CEE) and control variables; Model 6, DIV and HCE interaction term is added; Model 7, DIV and SCE interaction term is added; Model 8, DIV and CEE interaction term is added. Standard errors are in parentheses; **ρ < 0.05.

(β = −0.380; p < 0.05); hence, hypothesis H3 is accepted. The findings suggest that more income-diversified banks with higher IC performance take excessive risks and are less financially stable. The results may be due to a lack of complementariness between VAIC coefficients, as shown by their individual effects on risk-taking. Banks endowed with more intangible resources leverage these strategic resources for competitive advantage and superior performance through diversification. A shift from traditional intermediation activities destroys the positive value of IC on bank performance because knowledge-based assets are inimitable, non-substitutable, rare and non-transferable. In addition, since IC accumulates over time, it may be specific to banks' core activities. Moreover, Duho et al. (2019) argue that intellectual capital-rich banks will always avoid engaging in nonlending activities to attain stability and efficiency.

In Model 6, the interaction of DIV and HCE was added, and the interaction had a significant and negative impact on the Z-SCORE (β = −0.344; p < 0.05). Therefore, in its formulation, H3A cannot be rejected. More income-diversified banks with a high human capital efficiency tend to take excessive risks and, thus financially unstable. There are two probable reasons for the results. With the increased shift toward non-traditional activities, banks may spend more on employee training, and the returns from fee-based activities may not be sufficient to offset the extra training cost leading to lower profits and financial instability. Second, bank employees may lack specialized knowledge and skills to offer nonlending activities leading to low labour productivity. Model 7 was developed to test the moderating effect of SCE. The interaction term of DIV and SCE is positive and significant (β = 0.190; p < 0.05) failing to reject H3B. This implies that banks with a high share of non-interest

income and high SCE are more stable and have lower exposure to insolvency risks. With the increased advancement in information and communication technologies, banks are gradually adopting financial technologies in credit management and integrating lending and nonlending activities. This has contributed to effective appraisal and monitoring of loans and efficiency, ultimately improving profitability and financial stability.

Finally, in Model 8, the interaction between income diversification and CEE was entered to verify H3C. The results show a negative and significant effect on the Z-SCORE ($\beta = -0.191$; $p < 0.05$). This means that banks characterized by highly income diversification and high CEE face value destruction are more likely to go bankrupt. Therefore, H3c is also accepted. The negative impact of the interaction of income diversification and shareholders' investments (CEE) on financial stability (Z-SCORE) can be attributed to the fact that the banking business is highly regulated in the East African region. Diversifying into non-interest income earning businesses may necessitate the injection of more capital. However, supervisory regulations on capital requirements make it difficult for banks to easily adjust their capital employed to meet additional capital requirements on fee-based activities.

4.4. Additional analysis

To test the robustness of the findings, the study uses NPLs as an alternative measure of bank risk-taking to investigate the moderating effect of IC and its subcomponents on the income diversification and bank risk-taking relationship. Table 5 presents the system GMM results of the moderating effect of VAIC. The post-estimation results confirm that there is no second-order autocorrelation (AR2) and that all instruments are exogenous, which is proved by the Hansen test. Based on the results, DIV has a positive and significant effect on NPLs. This implies that focused banks perform better in managing their loan portfolios than those engaging in non-traditional banking activities, supporting H1. The results further confirm that VAIC has a negative coefficient for the alternative measure of risk-taking (NPL), suggesting that banks with higher IC performance take higher risks. The interaction term coefficient (DIV*VAIC) has a positive and significant effect on NPLs. Hence,

Table 5. System GMM regression results- Panel A

NPL	Model 1	Model 2	Model 3	Model 4
CONSTANTS	−.732(0.129)**	−.887(0.131)**	−.811(0.132)**	−.715(0.013)**
Control variable				
CAR	−.226(0.063)**	−.226(0.062)**	−.221(0.061)**	−.218(0.059)**
LEV	.130(0.036)**	.109(0.036)**	.104(0.035)**	.097(0.034)**
LIQ	.127(0.034)**	.122(0.033)**	.114(0.032)**	.104(0.031)**
BS	.058(0.012)**	.069(0.012)**	.061(0.012)**	.061(0.012)**
Independent variable				
DIV		.148(0.037)**	.126(0.038)**	−.062(0.066)
Moderating variable				
VAIC			.008(0.003)**	.006(0.003)**
Interaction effect				
DIV*VAIC				.056(0.016)**
Post estimation tests				
Instruments	60	61	62	63
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.868	0.905	0.979	0.963
Hansen	0.246	0.267	0.280	0.317

This table shows the estimated from dynamic panel-data estimation with two-step system GMM: Model 1, NPLs and control variables; Model 2, DIV is added; Model 3, VAIC is added; Model 4, the interaction between DIV and VAIC is added. Standard errors are in parentheses; **p < 0.05.

Table 6. System GMM regression results- Panel B

NPLS	Model 5	Model 6	Model 7	Model 8
_CONSTANTS	−.689(0.129)**	−.658(0.124)**	−.539(0.131)**	−.466(0.130)**
Controls				
CAR	−.173(0.058)**	−.147(0.057)**	−.128(0.056)**	−.150(0.056)**
LEV	.103(0.033)**	.096(0.032)**	.101(0.032)**	.099(0.031)**
LIQ	.095(0.031)**	.075(0.030)**	.079(0.030)**	.072(0.029)**
BS	.053(0.011)**	.051(0.011)**	.041(0.011)**	.034(0.011)**
Independent variables				
DIV	.098(0.036)**	.122(0.035)**	.105(0.035)*	.103(0.034)**
Moderating variables				
HCE	.009(0.003)**	.007(0.003)**	.007(0.003)**	.006(0.003)**
SCE	−.112(0.032)**	−.090(0.032)**	−.097(0.031)**	−.083(0.031)**
CEE	.194(0.062)**	.176(0.059)**	.128(0.063)**	.152(0.062)**
Interaction effects				
*DIV*HCE*		.084(0.018)**	.066(0.019)**	.048(0.020)**
*DIV*SCE*			−.017(0.007)**	−.015(0.007)**
*DIV*CEE*		3.21	-	.056(0.017)**
Post estimation tests				
Instrument	64	65	66	67
AR(1)	0.000	0.000	0.000	0.000
AR(2)	0.888	0.866	0.943	0.908
Group	0.284	0.385	0.379	0.385

This table shows the estimated from dynamic panel-data estimation with two-step system GMM: Model 5, NPLs, DIV, VAIC coefficients (HCE, SCE and CEE) and control variables; Model 6, DIV and HCE interaction term is added; Model 7, DIV and SCE interaction term is added; Model 8, DIV and CEE interaction term is added. Standard errors are in parentheses; **ρ < 0.05.

more income-diversified banks with high IC performance are more likely to suffer from higher credit risk. A probable explanation may be over-investment in IC dimensions to tap into fee-based activities, which exposes the banks to insolvency risks.

Table 6 presents the system GMM results for DIV and coefficients of VAIC as determinants of bank risk-taking (measured by NPLs). Noticeably, there is no second-order correlation. All instruments are exogenous, as indicated by the Hansen tests. The individual effects of the VAIC coefficients on NPLs are shown in Model 5. HCE and CEE are positively associated with NPLs. Specifically, a unit increase of HCE and CEE is associated with 0.009 units and 0.194 units rise in NPLs. Conversely, SCE is inversely associated with NPLs. This provides robustness to the results in Table 4 and supports sub-hypotheses H2A, H2B and H2C. The regression results for NPLs and the interaction terms for DIV and the subcomponents of VAIC are presented in Models 6–8 of Table 6. Based on the findings, banks with lower HCE take relatively lower risks and have lower NPLs. The beta coefficients of the interaction of DIV and HCE, DIV and CEE are positive and significant, while that of DIV and SCE is negative and significant. Consequently, the sub-hypotheses of H2 (H2A, H2B and H2C) are accepted. Banks well-endowed with human and financial capital are more likely to divert these valuable resources to nonlending activities, which may harm lending due to loss of focus and lack of expertise in managing non-banking activities. In addition, relatively low capitalization may not allow East African banks to lower NPLs by engaging in non-interest income-earning businesses. As for the combined effect of DIV and SCE on NPLs, advancement in financial technologies presents opportunities for banks to access

clients' information from nonlending activities, which reduces information asymmetry between the borrowers and the lenders, thus lowering NPLs.

5. Conclusion

This study examined the moderating role of IC on the relationship between income diversification and bank risk-taking. This study panel data from 50 banks operating in East Africa Community countries to accomplish its goal. The data were extracted from annual reports over twelve years (2010–2021). The main variables were bank risk-taking (Z-SCORE and NPLs), income diversification and intellectual capital (VAIC and its coefficients -HCE, SCE and CEE). The study adopted a hierarchical multiple regression and the S-GMM estimation technique to test the hypotheses. First, the study analyzed the influence of the control variable on bank risk-taking. Second, the study examined the effect of income diversification on risk-taking. Third, the study investigated the effect of VAIC and its elements on risk-taking. Finally, the study assessed the moderating effect of VAIC and its coefficients. The study found that all income diversification, VAIC and all its three components of ICE had a meaningful impact on risk-taking among the selected banks. In addition, the findings revealed that VAIC and its coefficient had a moderating effect on the income diversification-risk-taking nexus.

The findings of this study are beneficial to bank managers and policymakers. First, the study revealed that income diversification harms bank stability through excessive risk-taking. Therefore, the regulators should limit the extent banks diversify their income streams, perhaps through a celling based policy. Managers should also focus on the risk-return tradeoff while choosing a diversification strategy. Second, though prior studies have shown IC resources are the main drivers of competitive advantage and bank productivity, they can also lead to excessive risk-taking and bank instability. Therefore, in leveraging IC-based assets for competitive advantage and superior performance, managers must be aware of the likely negative outcome, such as taking excessive risks take may lead to bankruptcy. In addition, managers must recognize the specific components of IC that balance risk-taking and returns. This will enable them to make a reasonable investment to improve bank stability. Third, the finding indicates that highly income diversified banks endowed with high human capital efficiency and high capital employed are less stable and assume excessive risks. Managers should therefore find an optimal balance between investing in the two components of IC and expanding their services to non-traditional services, given the resulting risks.

Similarly, based on the findings, managers should exploit the positive interaction between banks' SCE and income diversification to lower risk exposure and improve financial stability. This study has some limitations. First, it focuses only on a sample of 50 East African banks. Future studies could examine a larger sample, other financial institutions like microfinance institutions and savings and credit cooperatives (SACCOs) in different jurisdictions. Second, this study evaluates the moderating effect of IC on the relationship between income diversification and bank risk-taking. Future studies may consider other moderating variables such as corporate governance and firm characteristics, for instance, size, leverage, and age.

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Correction
This article has been republished with minor changes. These changes do not impact the academic content of the article.

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References

Abbas, F., & Ali, S. (2022). Dynamics of diversification and banks' risk-taking and stability: Empirical analysis of commercial banks. *Managerial and Decision Economics*, *43*(4), 1000–1014. https://doi.org/10.1002/mde.3434

Abedifar, P., Molyneux, P., & Tarazi, A. (2014). Non-Interest Income Activities and Bank Lending (No. hal-

00947074). In *SSRN Scholarly Paper ID 2395799*. Rochester, NY: Social Science Research Network.

Abedifar, P., Molyneux, P., & Tarazi, A. (2018). Non-interest income and bank lending. *Journal of Banking & Finance*, *87*, 411–426. https://doi.org/10.1016/j.jbankfin.2017.11.003

Adesina, K. S. (2021). How diversification affects bank performance: The role of human capital. *Economic Modelling*, *94*, 303–319. https://doi.org/10.1016/j.econmod.2020.10.016

Adu, D. A. (2022). Competition and bank risk-taking in Sub-Saharan Africa countries. *SN Business & Economics*, *2*(7), 1–26. https://doi.org/10.1007/s43546-022-00250-1

Agustia, D., Muhammad, N. P. A., & Permatasari, Y. (2020). Earnings management, business strategy, and bankruptcy risk: Evidence from Indonesia. *Heliyon*, *6*(2), e03317. https://doi.org/10.1016/j.heliyon.2020.e03317

Alcaniz, L., Gomez-Bezares, F., & Roslender, R. (2011, June). Theoretical perspectives on intellectual capital: A backward look and a proposal for going forward. *Accounting Forum*, *35*(2), 104–117. No longer published by Elsevier. https://doi.org/10.1016/j.accfor.2011.03.004.

Alrashidi, A., & Alarfaj, O. (2020). The impact of intellectual capital efficiency on bank risks: Empirical evidence from the Saudi banking industry. *International Journal of Economics and Financial Issues*, *10*(4), 206. https://doi.org/10.32479/ijefi.9959

Alvino, F., Di Vaio, A., Hassan, R., & Palladino, R. (2020). Intellectual capital and sustainable development: A systematic literature review. *Journal of Intellectual Capital*, *22*(1), 76–94. https://doi.org/10.1108/JIC-11-2019-0259

Amihud, Y., & Lev, B. (1981). Risk reduction as a managerial motive for conglomerate mergers. *The Bell Journal of Economics*, *12*(2), 605–617. https://doi.org/10.2307/3003575

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies*, *58*(2), 277–297. https://doi.org/10.2307/2297968

Asare, N., Laryea, M. M., Onumah, J. M., & Asamoah, M. E. (2021). Intellectual capital and asset quality in an emerging banking market. *Asian Journal of Accounting Research*, *6*(1), 55–68. https://doi.org/10.1108/AJAR-05-2020-0034

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management*, *27*(6), 643–650. https://doi.org/10.1177/01492063010270060

Bhagat, S., Bolton, B., & Lu, J. (2015). Size, leverage, and risk-taking of financial institutions. *Journal of Banking & Finance*, *59*, 520–537. https://doi.org/10.1016/j.jbankfin.2015.06.018

Bikker, J. A., & Vervliet, T. M. (2018). Bank profitability and risk-taking under low interest rates. *International Journal of Finance & Economics*, *23*(1), 3–18. https://doi.org/10.1002/ijfe.1595

Boungou, W. (2020). Negative interest rates policy and banks' risk-taking: Empirical evidence. *Economics Letters*, *186*, 108760. https://doi.org/10.1016/j.econlet.2019.108760

Branco, M. C., Delgado, C., Sousa, C., & Sá, M. (2011). Intellectual capital disclosure media in Portugal. *Corporate Communications: An International Journal*, *16*(1), 38–52. https://doi.org/10.1108/13563281111100962

Brunnermeier, M. K. (2009). Deciphering the liquidity and credit crunch 2007-2008. *Journal of Economic Perspectives*, *23*(1), 77–100. https://doi.org/10.1257/jep.23.1.77

Cabrita, M., & Vaz, J. (2006). Intellectual capital and value creation: Evidence from the Portuguese banking industry. *The Electronic Journal of Knowledge Management*, *4*(1), 11–20. https://doi.org/10.1504/IJKL.2007.015555

Camisón, C., & Villar-López, A. (2010). Effect of SMEs' international experience on foreign intensity and economic performance: The mediating role of internationally exploitable assets and competitive strategy. *Journal of Small Business Management*, *48*(2), 116–151. https://doi.org/10.1111/j.1540-627X.2010.00289.x

Cenciarelli, V. G., Greco, G., & Allegrini, M. (2018). Does intellectual capital help predict bankruptcy? *Journal of Intellectual Capital*, *19*(2), 321–337. https://doi.org/10.1108/JIC-03-2017-0047

Chatterjee, S., Chaudhuri, R., Thrassou, A., & Sakka, G. (2021). Impact of firm's intellectual capital on firm performance: A study of Indian firms and the moderating effects of age and gender. *Journal of Intellectual Capital*, *23*(1), 103–126. https://doi.org/10.1108/JIC-12-2020-0378

Chiorazzo, V., Milani, C., & Salvini, F. (2008). Income diversification and bank performance: Evidence from Italian banks. *Journal of Financial Services Research*, *33*(3), 181–203. https://doi.org/10.1007/s10693-008-0029-4

Clarke, M., Seng, D., & Whiting, R. H. (2011). Intellectual capital and firm performance in Australia. *Journal of Intellectual Capital*, *12*(4), 505–530. https://doi.org/10.1108/14691931111181706

Conyon, M., Judge, W. Q., & Useem, M. (2011). Corporate governance and the 2008–09 financial crisis. *Corporate Governance: An International Review*, *19*(5), 399–404. https://doi.org/10.1111/j.1467-8683.2011.00879.x

Curado, C., Guedes, M. J., & Bontis, N. (2014). The financial crisis of banks (before, during and after): An intellectual capital perspective. *Knowledge and Process Management*, *21*(2), 103–111. https://doi.org/10.1002/kpm.1434

Dahir, A. M., Mahat, F. B., & Ali, N. A. B. (2018). Funding liquidity risk and bank risk-taking in BRICS countries: An application of system GMM approach. *International Journal of Emerging Markets*, *13*(1), 231–248. https://doi.org/10.1108/IJoEM-03-2017-0086

Dalwai, T., Singh, D., & Ananda, S. (2021). Intellectual capital, bank stability and risk-taking: Evidence from Asian emerging markets. *Competitiveness Review: An International Business Journal*, *32*(6), 995–1024. https://doi.org/10.1108/CR-03-2021-0031

Danisman, G. O., & Demirel, P. (2019). Bank risk-taking in developed countries: The influence of market power and bank regulations. *Journal of International Financial Markets, Institutions and Money*, *59*, 202–217. https://doi.org/10.1016/j.intfin.2018.12.007

Danışoğlu, S., Güner, Z. N., & Ayaydın Hacıömeroğlu, H. (2018). International evidence on risk taking by banks around the global financial crisis. *Emerging Markets Finance and Trade*, *54*(9), 1946–1962. https://doi.org/10.1080/1540496X.2017.1388779

DeYoung, R., & Roland, K. P. (2001). Product mix and earnings volatility at commercial banks: Evidence from a degree of total leverage model. *Journal of*

Financial Intermediation, *10*, 54–84. https://doi.org/10.1006/jfin.2000.0305

DeYoung, R., & Torna, G. (2013). Nontraditional banking activities and bank failures during the financial crisis. *Journal of Financial Intermediation*, *22*(3), 397–421. https://doi.org/10.1016/j.jfi.2013.01.001

Duho, K. C. T., Onumah, J. M., & Owodo, R. A. (2019). Bank diversification and performance in an emerging market. *International Journal of Managerial Finance*, *16*(1), 120–138. https://doi.org/10.1108/IJMF-04-2019-0137

Dzinkowski, R. (2000). The value of intellectual capital. *Journal of Business Strategy*, *21*(4), 3–3. https://go.gale.com/ps/i.do?id=GALE%7CA63924601&sid=googleScholar&v=2.1&it=r&linkaccess=abs&issn=02756668&p=AONE&sw=w

Edey, M. (2009). The global financial crisis and its effects. *Economic Papers: A Journal of Applied Economics and Policy*, *28*(3), 186–195. https://doi.org/10.1111/j.1759-3441.2009.00032.x

Edvinsson, L., & Malone, M. S. (1997). *Intellectual capital*. Harper Business.

Ehsan, S., & Javid, A. Y. (2018). Bank ownership structure, regulations and risk-taking: Evidence from commercial banks in Pakistan. *Portuguese Economic Journal*, *17*(3), 185–209. https://doi.org/10.1007/s10258-018-0147-3

Elsas, R., Hackethal, A., & Holzhäuser, M. (2010). The anatomy of bank diversification. *Journal of Banking & Finance*, *34*(6), 1274–1287. https://doi.org/10.1016/j.jbankfin.2009.11.024

Ferrero-Ferrero, I., Fernández-Izquierdo, M. Á., & Muñoz-Torres, M. J. (2012). The impact of the board of directors characteristics on corporate performance and risk-taking before and during the global financial crisis. *Review of Managerial Science*, *6*(3), 207–226. https://doi.org/10.1007/s11846-012-0085-x

Flöstrand, P., & Zambon, S. (2006). The sell side-observations on intellectual capital indicators. *Journal of Intellectual Capital*, *7*(4), 457–473. https://doi.org/10.1108/14691930610709112

Ghosh, S. K., & Maji, S. G. (2014). The impact of intellectual capital on bank risk: Evidence from Indian banking sector. *IUP Journal of Financial Risk Management*, *11*(3), 18. https://search.proquest.com/openview/659d9aed20cf102b3a5c8a4f627495db/1?pq-origsite=gscholar&cbl=54459

Githaiga, P. N. (2022). Intellectual capital and bank performance: The moderating role of income diversification. *Asia-Pacific Journal of Business Administration*, (ahead-of-print). https://doi.org/10.1108/APJBA-06-2021-0259.

Green, A., & Ryan, J. J. (2005). A framework of intangible valuation areas (FIVA). *Journal of Intellectual Capital*, *6*(1), 43–52. https://doi.org/10.1108/14691930510574654

Guimón, J. (2005). Intellectual capital reporting and credit risk analysis. *Journal of Intellectual Capital*, *6*(1), 28–42. https://doi.org/10.1108/14691930510574645

Haniffa, R. M., & Cooke, T. E. (2002). Culture, corporate governance and disclosure in Malaysian corporations. *Abacus*, *38*(3), 317–349. https://doi.org/10.1111/1467-6281.00112

Hansen, L. P. (1982). Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica*, *50*(4), 1029–1054. https://doi.org/10.2307/1912775

Hunjra, A. I., Hanif, M., Mehmood, R., & Nguyen, L. V. (2021). Diversification, corporate governance, regulation and bank risk-taking. *Journal of Financial Reporting and Accounting*, *19*(1), 92–108. https://doi.org/10.1108/JFRA-03-2020-0071

Jeitschko, T. D., & Jeung, S. D. (2005). Incentives for risk-taking in banking–A unified approach. *Journal of Banking & Finance*, *29*(3), 759–777. https://doi.org/10.1016/S0378-4266(04)00057-3

Kamukama, N., & Sulait, T. (2017). Intellectual capital and competitive advantage in Uganda's microfinance industry. *African Journal of Economic and Management Studies*, *8*(1), 498–51. https://doi.org/10.1108/AJEMS-02-2017-0021

Kasman, S., & Kasman, A. (2015). Bank competition, concentration and financial stability in the Turkish banking industry. *Economic Systems*, *39*(3), 502–517. https://doi.org/10.1016/j.ecosys.2014.12.003

Kim, D., & Santomero, A. M. (1988). Risk in banking and capital regulation. *The Journal of Finance*, *43*(5), 1219–1233. https://doi.org/10.1111/j.1540-6261.1988.tb03966.x

Kirkpatrick, G. (2009). The corporate governance lessons from the financial crisis. *OECD Journal: Financial Market Trends*, *2009*(1), 61–87. https://doi.org/10.1787/fmt-v2009-art3-en

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259–275. https://doi.org/10.1016/j.jfineco.2008.09.003

Lashitew, A. A., Ross, M. L., & Werker, E. (2021). What drives successful economic diversification in resource-rich countries? *The World Bank Research Observer*, *36*(2), 164–196. https://doi.org/10.1093/wbro/lkaa001

Le, T. D., & McMillan, D. (2021). Geographic expansion, income diversification, and bank stability: Evidence from Vietnam. *Cogent Business & Management*, *8*(1), 1885149. https://doi.org/10.1080/23311975.2021.1885149

Lerro, A., Linzalone, R., Schiuma, G., & Antonio Lerro, Dr Roberto Linzalone, D. (2014). Managing intellectual capital dimensions for organizational value creation. *Journal of Intellectual Capital*, *15*(3), 350–361. https://doi.org/10.1108/JIC-05-2014-0063

Lev, B. (2001). *Intangibles: Management, measurement and reporting*. Brookings Institution Press, New York University-Stern School Business

Lev, B., & Zambon, S. (2003). Intangibles and intellectual capital: An introduction to a special issue. *European Accounting Review*, *12*(4), 597–603. https://doi.org/10.1080/0963818032000162849

López-Penabad, M. C., Iglesias-Casal, A., & Neto, J. F. S. (2022). Effects of a negative interest rate policy in bank profitability and risk taking: Evidence from European banks. *Research in International Business and Finance*, *60*, 101597. https://doi.org/10.1016/j.ribaf.2021.101597

Markowits, H. M. (1952). Portfolio selection. *The Journal of Finance*, *7*(1), 71–91.

Marr, B., Schiuma, G., & Neely, A. (2004). The dynamics of value creation: Mapping your intellectual performance drivers. *Journal of Intellectual Capital*, *5*(2), 312–325. https://doi.org/10.1108/14691930410533722

Mention, A. L., & Bontis, N. (2013). Intellectual capital and performance within the banking sector of Luxembourg and Belgium. *Journal of Intellectual Capital*, *14*(2), 286–309. https://doi.org/10.1108/14691931311323896

Meslier, C., Tacneng, R., & Tarazi, A. (2014). Is bank income diversification beneficial? evidence from an emerging economy. *Journal of International Financial Markets, Institutions and Money*, *31*, 97–126. https://doi.org/10.1016/j.intfin.2014.03.007

Mollah, M. A. S., & Rouf, M. A. (2022). The impact of intellectual capital on commercial banks'

performance: Evidence from Bangladesh. *Journal of Money and Business*, *2*(1), 82–93. https://doi.org/10.1108/JMB-07-2021-0024

Moudud-Ul-Huq, S. (2019). Can BRICS and ASEAN-5 emerging economies benefit from bank diversification? *Journal of Financial Regulation and Compliance*, *27*(1), 43–69. https://doi.org/10.1108/JFRC-02-2018-0026

Nawaz, T., & Ohlrogge, O. (2022). Clarifying the impact of corporate governance and intellectual capital on financial performance: A longitudinal study of Deutsche Bank (1957–2019). *International Journal of Finance & Economics*, 1–16. https://doi.org/10.1002/ijfe.2620

Neffke, F., & Henning, M. (2013). Skill relatedness and firm diversification. *Strategic Management Journal*, *34*(3), 297–316. https://doi.org/10.1002/smj.2014

Nguyen, K. N. (2019). Revenue diversification, risk and bank performance of Vietnamese commercial banks. *Journal of Risk and Financial Management*, *12*(3), 1–21. https://doi.org/10.3390/jrfm12030138

Nguyen, D. T., Le, T. D., & Ho, T. H. (2021). Intellectual capital and Bank risk in Vietnam—A quantile regression approach. *Journal of Risk and Financial Management*, *14*(1), 27. https://doi.org/10.3390/jrfm14010027

Nguyen, M., Skully, M., & Perera, S. (2012). Market power, revenue diversification and bank stability: Evidence from selected South Asian countries. *Journal of International Financial Markets, Institutions and Money*, *22*(4), 897–912. https://doi.org/10.1016/j.intfin.2012.05.008

Onumah, J. M., & Duho, K. C. T. (2019). Intellectual capital: Its impact on financial performance and financial stability of Ghanaian banks. *Athens Journal of Business and Economics*, *5*(3), 243–268. https://doi.org/10.30958/ajbe.5-3-4

Pennathur, A. K., Subrahmanyam, V., & Vishwasrao, S. (2012). Income diversification and risk: Does ownership matter? An empirical examination of Indian banks. *Journal of Banking & Finance*, *36*(8), 2203–2215. https://doi.org/10.1016/j.jbankfin.2012.03.021

Pulic, A. (1998). Measuring the performance of intellectual potential in the knowledge economy. In *2nd McMaster word congress on measuring and managing intellectual capital by the Austrian team for intellectual potential* (pp. 1–20).

Pulic, A. (2000). Vaic™–an accounting tool for IC management. *International Journal of Technology Management*, *20*(5–8), 702–714. https://doi.org/10.1504/IJTM.2000.002891

Radaelli, G., Mura, M., Spiller, N., & Lettieri, E. (2011). Intellectual capital and knowledge sharing: The mediating role of organisational knowledge-sharing climate. *Knowledge Management Research & Practice*, *9*(4), 342–352. https://doi.org/10.1057/kmrp.2011.29

Rehman, A. U., Aslam, E., & Iqbal, A. (2022). Intellectual capital efficiency and bank performance: Evidence from Islamic banks. *Borsa Istanbul Review*, *22*(1), 113–121. https://doi.org/10.1016/j.bir.2021.02.004

Riahi-Belkaoui, A. (2003). Intellectual capital and firm performance of US multinational firms: A study of the resource-based and stakeholder views. *Journal of Intellectual Capital*, *4*(2), 215–226. https://doi.org/10.1108/14691930310472839

Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, *9*(1), 86–136. https://doi.org/10.1177/1536867X0900900106

Roos, G., & Roos, J. (1997). Measuring your company's intellectual performance. *Long Range Planning*, *30*(3), 413–426. https://doi.org/10.1016/S0024-6301(97)90260-0

Rylander, A., & Peppard, J. (2003). From implementing strategy to embodying strategy: Linking strategy, identity and intellectual capital. *Journal of Intellectual Capital*, *4*(3), 316–331. https://doi.org/10.1108/14691930310487789

Saif-Alyousfi, A. Y., Saha, A., & Md-Rus, R. (2020). The impact of bank competition and concentration on bank risk-taking behavior and stability: Evidence from GCC countries. *The North American Journal of Economics and Finance*, *51*, 100867. https://doi.org/10.1016/j.najef.2018.10.015

Shahwan, T. M., & Habib, A. M. (2020). Does the efficiency of corporate governance and intellectual capital affect a firm's financial distress? Evidence from Egypt. *Journal of Intellectual Capital*, *21*(3), 403–430. https://doi.org/10.1108/JIC-06-2019-0143

Sharabati, A. A. A., Nour, A. N. I., & Shamari, N. S. (2013). The impact of intellectual capital on Jordanian telecommunication companies' business performance. *American Academic & Scholarly Research Journal*, *5*(3 special issue), 32. https://www.academia.edu/download/72781861/The_Impact_of_Intellectual_Capital_on_Jo20211016-27350-ygvx6w.pdf

Soedarmono, W., Machrouh, F., & Tarazi, A. (2013). Bank competition, crisis and risk taking: Evidence from emerging markets in Asia. *Journal of International Financial Markets, Institutions and Money*, *23*, 196–221. https://doi.org/10.1016/j.intfin.2012.09.009

Ståhle, P., Ståhle, S., & Aho, S. (2011). Value added intellectual coefficient (VAIC): A critical analysis. *Journal of Intellectual Capital*, *12*(4), 531–551. https://doi.org/10.1108/14691931111181715

Steenkamp, N., & Kashyap, V. (2010). Importance and contribution of intangible assets: SME managers' perceptions. *Journal of Intellectual Capital*, *11*(3), 368–390. https://doi.org/10.1108/14691931011064590

Stewart, T. A. (1997). *Intellectual Capital*. Doubleday-Currency.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics*. HarperCollins Publisher.

Uddin, A., Chowdhury, M. A. F., Sajib, S. D., & Masih, M. (2020). Revisiting the impact of institutional quality on post-GFC bank risk-taking: Evidence from emerging countries. *Emerging Markets Review*, *42*, 100659. https://doi.org/10.1016/j.ememar.2019.100659

Ullah, A., Pinglu, C., Ullah, S., Qian, N., & Zaman, M. (2021). Impact of intellectual capital efficiency on financial stability in banks: Insights from an emerging economy. *International Journal of Finance & Economics*, 1–14. https://doi.org/10.1002/ijfe.2512

Vo, D. H., & Tran, N. P. (2021). Intellectual capital and bank performance in Vietnam. *Managerial Finance*, *47*(8), 1094–1106. https://doi.org/10.1108/MF-03-2020-0143

Wang, C., & Lin, Y. (2021). Income diversification and bank risk in Asia Pacific. *The North American Journal of Economics and Finance*, *57*, 101448. https://doi.org/10.1016/j.najef.2021.101448

Weqar, F., Khan, A. M., Raushan, M., & Haque, S. M. (2021). Measuring the impact of intellectual capital on the financial performance of the finance sector of India. *Journal of the Knowledge Economy*, *12*(3), 1134–1151. https://doi.org/10.1007/s13132-020-00654-0

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, *5*(2), 171–180. https://doi.org/10.1002/smj.4250050207

Yousaf, M. (2021). Intellectual capital and firm performance: Evidence from certified firms from the EFQM excellence model. *Total Quality Management &*

Business Excellence, 1–17. https://doi.org/10.1080/14783363.2021.1972800

Zamore, S. (2018). Should microfinance institutions diversify or focus? A global analysis. *Research in International Business and Finance*, *46*, 105–119. https://doi.org/10.1016/j.ribaf.2017.12.001

Zheng, C., Islam, M. N., Sadekin, M. N., & Huq, S. M. U. (2022). The impact of intellectual capital on bank risk: Evidence from banking sectors of Bangladesh. *International Journal of Research in Business and Social Science (2147- 4478)*, *11*(4), 183–192. https://doi.org/10.20525/ijrbs.v11i4.1777

Zhou, K. (2014). The effect of income diversification on bank risk: Evidence from China. *Emerging Markets Finance and Trade*, *50*(sup3), 201–213. https://doi.org/10.2753/REE1540-496X5003S312

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