“Intellectual capital and firm performance of Jordanian financial institutions”

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INTELLECTUAL CAPITAL AND FIRM PERFORMANCE OF JORDANIAN FINANCIAL INSTITUTIONS

Abstract

This study aims to explore the financial implications of intellectual capital in the Jordanian financial sector during the period 2009–2018. It uses Pulic's (2004) value-added intellectual capital model, particularly capital employed efficiency, structural capital efficiency, and human capital efficiency, and tests its potential effect on firm financial performance measures, including return on assets, return on equity, asset utilization ratio, and Tobin's Q. The study's findings demonstrate that value-added intellectual capital positively influences the financial performance of Jordanian financial companies. Value-added intellectual capital is not found to have a significant impact on productivity, but it is strongly and positively related to firm profitability and market value. As for the main components of value-added intellectual capital, human capital efficiency has a significantly positive impact on a company's performance, but regarding structural capital efficiency, the outcomes vary depending on the measure of firm performance. Notably, when firms are categorized into sub-industries (banks, insurance companies, and financial service companies), it is found that the profitability of insurance companies is more affected by intellectual capital than that of banks or financial services. The results also show that investors place great importance on the efficiency of intellectual capital, particularly within the banking industry. Furthermore, implementing Shariah compliance standards boosts the positive effect of structural capital efficiency on corporate market value and reinforces the positive influence of human capital efficiency on productivity.

Keywords intellectual capital, financial performance, financial sector, Sharia compliance, Jordan

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INTRODUCTION

Organizations strive to optimize the growth and enhancement of their performance. In previous decades, the focus was mainly on tangible sources to generate revenues and improve their level. In recent years, there has been a notable transition towards technology and innovation in the financial sector to improve competitiveness.

The financial sector is widely recognized as highly adaptable to intangible factors, prompting investigation into their optimal utilization for enhancing performance and stability. The aforementioned factors prompted banks and other financial institutions to place significant emphasis on intellectual capital (IC) and strive to maximize its benefits (Olohunlana et al., 2022; Nazir et al., 2020) and, hence, contribute to achieving greater economic stability and growth.

IC gained significant interest as knowledge-based capital became recognized as vital in generating wealth, creating value (Chu et al., 2011), and gaining a competitive edge (Ting & Lean, 2009). Therefore, researchers initially examined the concept of IC (Ting & Lean, 2009;

Ashton, 2005; Teece, 2000; Itami, 1987), and considerable attention was directed toward the financial institutions. Due to differences in core operations and business strategy, IC can significantly differ between the types of financial institutions, including banks, insurance, and financial services firms. On the other hand, Islamic and conventional financial institutions are actively working to enhance their competitiveness in the market, leading them to place importance on IC.

In this perspective, this study provides timely evidence relevant to policy makers and financial institution managers and directors on the importance on investing in IC to improve their financial performance. In Jordan, the setting of this study, the financial sector is a very important contributor to the nation's economy, and the potential of improving its financial performance by investment in IC is therefore important and worthy of researching. Therefore, this study covers this topic in the Jordanian context.

1. LITERATURE REVIEW AND HYPOTHESES

Scholars have increasingly recognized the significance of IC which is found contributing to value creation of firms. The significance of intangible sources, in addition to tangible ones, is widely recognized in institutions, especially financial institutions, due to their crucial role in competitiveness and overall success for these institutions (Nawaz et al., 2021). Therefore, businesses start competing in reporting IC information (Petty & Cuganesan, 2005).

To demonstrate the effect of IC on the financial performance of banks and other financial institutions, examinations were conducted on the underlying relationship by many scholars worldwide using Pulic's (2004) model of VAIC (Value Added Intellectual Capital) due to its simplicity to use and the availability of the financial data it requires (Xu & Wang, 2018).

The studies examining the underlying association vary in their results. The majority of the studies recognized a positive effect of IC on the financial performance (Javaherizadeh, 2021; Suryani & Nadhiroh, 2020; Uslu, 2020; Yen et al., 2019; Ozkan et al., 2017; Nawaz & Haniffa, 2017; Karacan & Ergin, 2011).

However, IC showed a minimal effect on the financial performance of financial services organizations in Hong Kong (Chu et al., 2011). This finding is particularly noteworthy, considering Hong Kong's status as one of the world's most important financial hubs.

In their study, Kaupelytė and Kairytė (2016) found that the impact of IC on financial performance varies depending on the size of a bank. They observed that large firms experienced a negative impact on performance after the financial crisis, while small firms experienced a negative impact on performance before the financial crisis. Another investigation conducted on Nigeria's developing banking market using the Data Envelopment Analysis (DEA) technique found that over 90% of the sample was inefficient in IC, which is influenced by a bank's size (Olohunlana et al., 2022). Likewise, Joshi et al. (2013) found that two-thirds of the Australian financial sector suffer from the inefficiency of IC.

With the division of VAIC into its three components, the influence of each part experienced a significant and different result though. Human capital efficiency (HCE), structural capital efficiency (SCE), and capital employed efficiency (CEE), or physical capital efficiency, are the three main categories of VAIC (Pulic, 2004). According to Castro et al. (2021), the three elements of VAIC have a more significant impact on the financial performance of Colombian banks than VAIC itself.

Empirical studies have consistently shown that HC is crucial for financial performance (Olohunlana et al., 2022; Isola et al., 2020), HCE has a more significant influence on a company's financial performance compared to both SCE and SCE, especially within the banking industry (Nawaz & Ohlrogge, 2022; Yen et al., 2019; Joshi et al., 2013). HC, including skills, knowledge, and experiences, is crucial for an organization's long-term goals (Haris et al., 2019). Uslu (2020) recommended that Turkish banks focus on client care, financial boosts, and knowledgeable staff. The study's findings can benefit investors and decision-makers in assessing performance across every area of banking. Likewise, Vietnam's banking sector has shown a significant impact of HCE on firm

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performance (Tran & Vo, 2020), recommending the need for improved incentives and training programs. Therefore, HC enhances the value creation in the financial sector (Joshi et al., 2013; Ting & Lean, 2009).

Although SC has a relatively lesser influence on financial performance, this does not, however, rule out the function of structural capital (SC), which Nawaz (2019) views as a "supporting mechanism" for IC. SC, including intangible assets and processes, supports HC (Hsu & Wang, 2010).

Moreover, Yen et al. (2019) found a link between SC and CE in 86.7% of empirical papers they reviewed, that when SC affects financial performance, CE affects the financial performance as well. On the other hand, Uslu (2020) concluded that SCE has the most substantial influence on banks' financial performance, followed by HCE and SCE which showed insignificant effect on financial performance of the Turkish banking sector.

Regarding the relationship between SCE, HCE, and financial performance measurements, Joshi et al. (2013) found it to be significantly positive. The influence of HCE and SCE on financial performance was found to be greater than that of SCE. They found that SCE has an adverse effect on the financial performance of companies in China, Taiwan, and Hong Kong. Nevertheless, HCE has a no significant influence on firms in Taiwan and Hong Kong (Nazir et al., 2020). Thus, resource-based theory suggests that it is advisable to invest in all components of IC collectively (Wernerfelt, 1984).

Given the different standards employed by conventional financial institutions and Islamic ones, it is crucial to assess if the underlying relationship has been impacted by this disparity. In their study, Nawaz and Haniffa (2017) analyzed Islamic banks in 18 countries over five years. They discovered that the IC has a positive effect on financial profitability. Particularly, they found that HCE and SCE had significant impacts on profitability. Furthermore, a bank's size revealed a positive impact on the relationship between IC and profitability measures. Meanwhile, the leverage has a negative effect on this relationship.

According to the financial data from Southeast and Middle Eastern countries from 2016 to 2019, Nizar (2021) found that SCE has been shown to have a positive impact on financial performance of Sharia-compliant insurance companies. SCE, on the other hand, has a negative impact on the performance of those companies. It is expected that those findings will aid in the improvement of Sharia insurance management.

In general, the literature reviewed shows that in many cases IC components were found to have a positive effect on financial performance of companies. Consequently, this study aims to investigate the relation between VAIC and its three components and the financial performance of Jordanian financial sector. What distinguishes the current study is the investigation of the underlying relationships by industry (namely banks, insurance companies, and financial service companies). Moreover, it examines the role of conventional and Islamic perspectives regarding the underlying association.

As a result, the following hypotheses were developed:

H01: VAIC and its components positively affect the financial performance of financial institutions in Jordan.

H02: Industry influences the association of VAIC and its components with the performance of financial institutions in Jordan.

H03: Shariah compliance influences the association of VAIC and its components and the performance of financial institutions in Jordan.

2. METHODOLOGY

The current study examines the link between IC and the performance of financial firms listed on the Amman Stock Exchange (ASE) between 2009 to 2018. The start of the study period in 2009 is to some extent influenced by the enactment of a new corporate governance code that had a significant effect on improving corporate governance in Jordanian companies. The exclusion of the period after 2018 is a result of the COVID-19 pandemic. This period, characterized by global economic and financial turmoil, has introduced significant anomalies and distortions in stock markets. The exclusion of the COVID-19 period is essential to

maintain the reliability of this study's findings and to ensure that the results adequately reflect the influence of IC on firm performance under normal market conditions, thereby eliminating the effects of matters such as online work and reduction in investment in IC. Data were collected manually from the annual reports and financial statements available on the ASE website. This comprehensive data collection encompassed 65 firms across three key financial sectors: banks, insurance companies, and financial service companies. The study also included a range of other explanatory variables sourced from the same annual reports. In total, the dataset comprised 650 firm-year observations. The distribution of these companies, categorized according to their market segment, is detailed in Table 1.

Table 1. Sample distribution

Section	Firm-year observations	Percentage
Banks	150	23%
Diversified financial services	200	30.8%
Insurance	300	46.2%
Total	650	100%

This study investigates the impact of IC on the performance and valuation of financial firms in emerging markets. To test its hypotheses, four widely recognized performance measures were utilized from accounting and finance literature:

Return on Assets (ROA): This profitability metric, calculated as net income divided by total assets, gauges a firm's ability to generate income from its assets. It reflects the firm's efficiency in asset utilization for income generation (Firer & Williams, 2003; Clarke et al., 2011).

Return on Equity (ROE): ROE measures the efficiency of profit generation from net assets, indicating how effectively investment funds are used to grow earnings. It is computed as net income divided by total equity (Nadeem et al., 2017; Nawaz & Haniffa, 2017).

Asset Utilization Ratio (AUR): Defined as total revenue divided by the book value of total assets, and it indicates a firm's productivity and asset utilization effectiveness. It reflects how well a firm deploys its assets to generate revenue (Nadeem et al., 2017; Smriti & Das, 2018).

Tobin's Q: This market-based performance indicator, calculated as the market value of a company's outstanding shares plus the book value of its debts divided by the replacement cost of its assets, assesses how the market values a company's assets. Tobin's Q offers a perspective on the company's asset valuation relative to its market value (Nimtrakoon, 2015; Sardo & Serrasqueiro, 2017).

To measure IC efficiency, this study adopts the value-added intellectual capital (VAIC) method based on Pulic (2000, 2004). VAIC, a composite measure comprising human capital (HC), structural capital (SC), and capital employed (CE), gauges the efficiency of a firm's total resources, including both tangible and intangible assets, in creating value (Ho & Williams, 2003; Tan et al., 2008).

The VAIC calculation involves three steps:

1) Value Added (VA): Determined by subtracting total expenses (excluding employee expenses) from total revenue. Employees' wages and salaries have a fundamental role in value creation and are considered as invested capital, therefore, employee expenses are not included.

2) Intellectual Capital Efficiency (ICE): ICE, comprising HCE and SCE, reflects the value added per dollar of human and structural capital. HCE indicates the value-added efficiency by human resources, treating staff expenditures as investments (Al-Musali & Ku Ismail, 2016). SCE is derived from what remains after accounting for human capital's contribution, reflecting the efficiency of organizational processes and infrastructures in value creation (Watson & Stanworth, 2006).

3) CEE: Capital employed efficiency measures the value created per unit of financial and physical capital invested, emphasizing that IC alone cannot generate value (Pulic, 2004). SCE is calculated as VA divided by capital employed (CE), where CE represents net assets (total assets minus liabilities).

Finally, VAIC is computed as the sum of HCE, SCE, and CEE. A higher VAIC indicates greater efficiency in value creation using IC resources.

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In this study, key firm-specific variables were incorporated as controls, drawing on established theoretical and empirical frameworks (e.g., Nimtrakoon, 2015; Sardo & Serrasqueiro, 2017; Nadeem et al., 2017; Smriti & Das, 2018). Specifically, the analysis includes:

Firm Size (SIZE): Represented by the natural logarithm of a firm's total assets in a given period.

Leverage (LEVG): Defined as the ratio of total liabilities to total assets for each firm in a given period.

Firm Age (AGE): Calculated as the number of years since a firm's establishment.

Additionally, the model accounts for annual variations (year effect) and industry-specific characteristics (industry effect), such as regulatory differences across industries.

IC is a strategic resource for achieving competitive advantage and driving value creation. Consistent with Clarke et al. (2011), it is posited that a firm's utilization of its physical and financial capital, as moderated by its IC, significantly impacts its performance. Accordingly, the effect of IC was examined on financial institutions' performance through multivariate regression models. These models assess how IC influences firm profitability and overall performance.

Model 1

$$\begin{aligned} &Firm's\ Performance\ Indicator = \alpha 0 \\ &+\beta 1 \cdot VAIC + \beta 2 \cdot SIZE + \beta 3 \cdot LEVG \\ &+\beta 4 \cdot AGE + \sum \beta j \cdot Year\ fixed\ effectsj \\ &+\sum \beta k \cdot Industry\ fixed\ effectsk + \varepsilon, \end{aligned} \quad (1)$$

Model 2

$$\begin{aligned} &Firm's\ Performance\ Indicator = \alpha 0 \\ &+\beta 1 \cdot HEC + \beta 2 \cdot SEC + \beta 3 \cdot CEE \\ &+\beta 4 \cdot SIZE + \beta 5 \cdot LEVG + \beta 6 \cdot AGE \\ &+\sum \beta j \cdot Year\ fixed\ effectsj \\ &+\sum \beta k \cdot Industry\ fixed\ effectsk + \varepsilon. \end{aligned} \quad (2)$$

Definitions for all study variables are detailed in Table 2. To reduce the effects of outliers, continuous variables were winsorized at the 1% and 99% levels. Recognizing the potential for serial and cross-sectional correlation in the panel data set, as noted by Gow et al. (2010), their recommendation was adopted for more robust statistical inferences. Accordingly, standard errors were clustered

Table 2. Operationalization variables

Variable name	Variable Definition
Dependent Variables (Performance Indicator)	
ROA	Net income divided by total assets
ROE	Net income divided by total equity
AUR	Total revenue divided by the book value of total assets
Tobin's Q	The market value of a company's outstanding shares plus the book value of the company's debts divided its assets' replacement cost
Independent Variables	
HEC	Human capital efficiency, calculated by dividing the value added by the human capital; HCE = VA/HC, where: VA = Net income – total expenses, excluding employee expenses HC = employees' salaries and wages
SEC	Structural capital efficiency, calculated by dividing the structural capital by the value added; SCE = SC/VA, where: SC = the difference between VA and HC VA = Net income – total expenses, excluding employee expenses
CEE	Capital employed efficiency, calculated by dividing the value added by the book value of net assets; CEE = VA/CE, where: VA = Net income – total expenses, excluding employee expenses CE = the difference between total assets and total liabilities
VAIC	Value added intellectual coefficient where VAIC = HCE + SCE + CEE
Control Variables	
SIZE	The natural logarithm of the book value of a firm's total assets, for the firm (*i*), in the period (*t*)
LEVG	Total liabilities divided by total assets for the firm (*i*), in the period (*t*)
AGE	The number of years since the firm was established for the firm (*i*), in the period (*t*)

by both firm and year in our regression analysis, addressing concerns of serial correlation and heteroskedasticity more effectively than traditional methods.

3. RESULTS AND DISCUSSION

3.1. Descriptive statistics

Table 3 presents the summary statistics for the variables utilized in the analysis. The average Tobin's Q is notably high at 0.981, indicating that the firms' market values surpass their book values. However, the relatively low means of ROA (0.003) and ROE (0.022) suggest that firms generally struggle to generate profits from their assets and invested capital. The mean AUR at 0.193 also indicates challenges in achieving optimal productivity.

In examining the components of VAIC, SCE emerges as a key contributor to value creation in financial institutions, with the highest mean of 1.088. This contrasts with the lower means of HCE and SCE, at 0.117 and 0.081, respectively. The significant variation in SCE's value creation across firms is reflected in its high standard deviation of 12.212, which is attributable to the diverse structures and practices across the sampled financial sectors.

The combined mean for HCE and SCE, representing IC efficiency, is 1.205, surpassing SCE's mean of 0.081. This underscores the greater value derived from IC compared to physical and financial resources in financial companies, aligning with prior studies (Nawaz & Haniffa, 2017; Hamdan, 2018; Smriti & Das, 2018; Xu & Li, 2022). The overall mean of VAIC stands at 1.286, suggesting that financial firms generate an average value of 1.286 for every monetary unit invested. Details on control variables are further provided in Table 3.

Table 4 shows Pearson correlations for the regression variables. VAIC shows a positive relationship with measures like ROA, ROE, and AUR. However, its correlation with Tobin's Q is not significant with negative sign. SCE, within VAIC's

Table 3. Descriptive statistics of the variables

Variable	Observations	Mean	SD	Minimum	Maximum
ROA	639	0.003	0.074	–0.471	0.840
ROE	638	0.022	0.174	–2.163	0.845
AUR	639	0.193	0.236	–0.116	1.046
Tobin's Q	638	0.981	0.757	0.020	11.906
HCE	639	0.117	12.212	–215.324	87.461
SCE	639	1.088	12.279	–16.344	306.390
CEE	639	0.081	0.385	–8.693	1.363
VAIC	639	1.286	17.294	–214.437	306.386
LEVG	639	0.455	0.313	0.001	2.380
SIZE	639	7.760	0.970	5.556	10.413
AGE	639	30.363	17.251	5	92

Table 4. Correlation matrix

Variable	*ROA*	*ROE*	*AUR*	*Tobin's Q*	*HCE*	*SCE*	*CEE*	*VAIC*	*LEVG*	*SIZE*	*AGE*
ROA	1	–	–	–	–	–	–	–	–	–	–
ROE	0.578***	1	–	–	–	–	–	–	–	–	–
AUR	0.115***	–0.079**	1	–	–	–	–	–	–	–	–
Tobin's Q	–0.167***	–0.087**	0.051	1	–	–	–	–	–	–	–
HCE	0.427***	0.270***	0.068*	–0.057	1	–	–	–	–	–	–
SCE	–0.042	–0.051	0.048	0.01	–0.007	1	–	–	–	–	–
CEE	0.237***	0.292***	–0.014	–0.068*	0.130***	–0.016	1	–	–	–	–
VAIC	0.277***	0.161***	0.082**	–0.034	0.704***	0.705***	0.103***	1	–	–	–
LEVG	0.159***	0.224***	0.234***	0.119***	0.136***	0.018	0.114***	0.111***	1	–	–
SIZE	0.155***	0.299***	–0.275***	–0.185***	0.103***	–0.037	0.137***	0.049	0.628***	1	–
AGE	0.159***	0.214***	0.082**	0.112***	0.139***	0.002	0.159***	0.103***	0.478***	0.539***	1

Note: Asterisks denote statistical significance levels: * for 10%, ** for 5%, and *** for 1%, using two-tailed tests.

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subcomponents, is negatively, but not significantly, correlated with these performance measures. AUR significantly relates to HCE, while Tobin's Q negatively correlates with SCE. Control variables LEVG and AGE show positive correlations with all performance metrics, whereas SIZE correlates positively with ROA and ROE but negatively with AUR and Tobin's Q. To address potential multicollinearity concerns, Variance Inflation Factors (VIFs) were employed, which show that VIF is below 5, indicating that multicollinearity is unlikely to bias the regression results.

3.2. Regression results and discussion

Regression results reported in this section lead to the general acceptance of this study's three hypotheses. In particular, Table A1 (the Appendix section) details regression analyses exploring how IC efficiency affects ASE-listed financial corporations' performance. Results indicate that individual VAIC components provide more explanatory power than the aggregated VAIC index, aligning with previous research (Firer & Williams, 2003; Al-Musali & Ku Ismail, 2016; Dalwai & Mohammadi, 2020). Specifically, VAIC significantly enhances firm profitability and market value but has a minimal effect on productivity. HCE positively impacts firm performance, while SCE's influence varies by performance measure. SCE positively correlates with profitability but not market value. Sector-specific analyses (Tables A2 and A3) reveal VAIC's positive effect on profitability across all sectors, with a more pronounced impact on insurance. VAIC's positive influence on productivity is confined to financial services, while its market value enhancement is notable in banking. HCE boosts profitability in insurance and financial services but not in banking. SCE positively affects market value in banking, but its impact on profitability is mixed across sectors. SCE significantly influences profitability in financial services and productivity in banking and insurance. As for the impact of IC components on the performance of financial institutions in Jordan, the results show that VAIC positively affects firm profitability and market value. The results agree with previous studies conducted by Ku Ismail and Abdul Karem (2011), Mondal and Ghosh (2012), and Al-Musali and Ku Ismail (2016), who found a positive influence of IC on the performance of financial institutions in emerging economies.

Overall, the findings from the estimated regression models confirm that IC plays a significant role in value creation and gaining sustainable competitive advantage in business, as firms with efficient IC tend to have higher profitability and better performance. Additionally, the result is consistent with the notion of Xu and Li (2022) who emphasize the possibility of using IC as a potential value-creation instrument. As for SCE, the results are mixed depending on the firm performance employed as a dependent variable. Regarding profitability, Table A1 shows that ROA (coefficient = −0.018) is significantly and negatively related to SCE at the 5% level. In contrast, ROE shows a positive and significant association with SCE (coefficient = 0.017) at the 10% level. A possible explanation for this contradictory finding is the measurement of ROA and ROE. The denominator of ROE only includes shareholders' equity, while the calculation of ROA includes the sum of total assets. Therefore, ROA indicates how effectively management generates earnings from its assets. At the same time, ROE is an indicator of a firm's efficiency in generating earnings from each dollar of equity invested by its shareholders. The negative association between ROA and SCE indicates that inefficient utilization of IC and its components may lead the firm to be less effective in using its tangible assets to generate earnings and justify the increase in total tangible assets (e.g., Al-Musali & Ku Ismail, 2016). As for positive association with ROE, the result shows that financial firms in Jordan efficiently utilize SC to generate income and growth from its equity investment but not from tangible assets. Another possible explanation for the negative association of ROA is related to the fact that one of the main components of ROA is total liabilities. The dependence of financial firms on debts to finance their investment in SC, and not equity investment only, leads to more expenses to be incurred (i.e., financing cost), which is perceived negatively by investors that firms are inefficient in utilizing equity funds to enhance IC. The positive finding of ROE confirms such a premise and suggests that investors are keen to have firms more focused on financing their investment in SC from capital investment contributions rather than debt financing.

As for the other indicators of firm performance, SCE is significantly and positively affecting AUR. This finding is in line with Mondal and Ghosh

(2012) who find that SC predicts productivity and efficiency in financial firms. This result suggests that while Jordanian firms have difficulty in employing SC to generate profit from using their assets, this might be attributed to the fact that that SC employed may incur additional costs for companies and lead to a decrease in the firm's profitability, firms are more capable of exploiting their SC to generate more sales revenue and enhance productivity.

Regarding market valuation, Table A1 shows that SCE has a negative and significant association with Tobin's Q (coefficient = –0.020) at the 1% level. One possible explanation is that the market may react negatively if a firm concentrates on enhancing SC resources. Another explanation is that investors may place investment decisions on different aspects or components of IC (Firer & Williams, 2003). The negative association contradicts with previous studies that show a positive impact for SC on market valuation. However, Chan (2009) suggests that disparity among investors in their level of awareness of the importance of IC and its components in value creation in companies may vary from country to country. As a result, the influence of IC on market value might differ from country to country. In addition, the Jordanian financial market is known to be limited in its efficiency, leading to the above finding on Tobin's Q, given that it is a measure based on market value.

For the other components, HCE show a positive and significant relation with all indicators of firm performance. This finding suggests that Jordanian financial firms benefit from the investment in training, improving, and sustaining the skills of their employees. Further, the result confirms the argument of Al-Musali and Ku Ismail (2016) that human capital is vital in creating innovative operations that can ultimately improve firms' financial performance.

As for the final component of IC, the results show that SCE is positively and significantly related to profitability measures only, ROA (coefficient = 0.242) and ROE (0.711) at the 1% level. The analysis reveals that among the components of VAIC, physical capital is the most significant in driving firm performance for Jordanian financial institutions. This is evidenced by its higher standardized coefficient compared to HCE and SCE. The findings align with studies by Firer and Williams (2003), Al-Musali and Ku Ismail (2016), Nadeem et al. (2017), and Smriti and Das (2018), reinforcing physical capital's key role. However, the relationship between SCE and indicators like AUR and Tobin's Q is found to be insignificant in the regression analysis.

The regression results, as detailed in Tables A2 and A3 (the Appendix section), provide insightful perspectives on the influence of VAIC and its components on firm performance across different financial sectors in the ASE. The study's findings, as presented in Table A2, indicate that VAIC enhances firm profitability across all examined financial sectors. This suggests that irrespective of the sector-specific dynamics, efficient utilization of IC is a key driver of profitability. Notably, the profitability of insurance firms appears to be more responsive to IC than the banking and financial services firms. This could be attributed to the nature of the insurance industry, where IC plays a key role in product innovation and risk assessment. As for productivity, the positive impact of VAIC is restricted to the financial services sector. This sector's reliance on innovative financial products and services, driven by intellectual resources, might explain this sector-specific impact. In the context of market value, the findings reveal that investors place a higher value on efficient IC. However, this value enhancement effect is limited to the banking industry. This suggests a unique appreciation for IC management in banking, possibly due to the industry's competitive environment and the critical role of knowledge-based assets in sustaining competitive advantages.

The disaggregation of VAIC into HCE, SCE, and CEE reveals further impacts across sectors. The findings show that HCE significantly boosts profitability in the insurance and financial services sectors but not in banking. This might be due to the nature of human capital, such as expertise and client relationships, being more directly linked to profit generation in these sectors. In contrast, SCE positively influences a firm's market value only in the banking sector, indicating that structural capital, like technological infrastructure and organi-

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zational processes, is highly valued. However, its negative effect on profitability in insurance suggests possible inefficiencies or over-investments in structural capital within this sector. Conversely, SCE has a positive effect on financial services firms. Overall, the mixed results suggest that the impact of SC is not homogenous across financial sectors. One possible explanation is the sector-specific strategies in managing and leveraging SC. Concerning SCE, the results show that physical and financial capital significantly impacts the profitability of financial services firms and productivity in banking and insurance, suggesting the effective utilization of such capital in enhancing performance and generating profits. On the other hand, SCE shows a limited role in boosting the market value across sectors, indicating that the role of physical and financial capital in such industries is diminishing, possibly due to the overshadowing of the intangible elements of IC.

Considering the firms that state that they adhere to Islamic jurisprudence, Table A4 (the Appendix section) examines Shariah compliance's moderating role, using a dummy variable (SHARIAH_COM) indicating adherence to Islamic financial principles. The results show that while Shariah compliance does not significantly moderate the impact of VAIC on performance measures, it does enhance the positive effects of HCE on productivity and SCE on market value. The positive influence of HCE on productivity is enhanced in the context of Shariah compliance. This enhancement could be attributed to Shariah principles' ethical and social considerations aligning well with human capital development strategies. Similarly, applying Shariah financial rules positively impacts SCE's influence on firms' market value. This might be due to investors' and stakeholders' recognition of the value added by structural capital, particularly if firms adhere to practices prescribed by the Islamic Shariah. Interestingly, this adherence is found to negatively affect the relationship between SCE and productivity. This could be indicative of the constraints imposed by Shariah compliance on capital utilization, such as the prohibition of certain types of investments or financial instruments, limiting how capital can be employed where Islamic jurisprudence is applied.

CONCLUSION

This paper examines the impact of IC on the financial performance of Jordan's financial sector. It finds a significant positive relationship between IC and both accounting-based financial performance measures (ROA and ROE) and market performance (Tobin's Q), indicating its importance for value creation and competitive advantage. However, the AUR did not show this association. The VAIC component models (HCE, SCE, and CEE) demonstrated better explanatory power than VAIC models using the four performance measures. In particular, HCE and CEE are found to have a positive relation with financial performance, while SCE is positively associated with ROE, but negatively associated with ROA. In addition, financial leverage, firm age, and firm size positively affect firm performance.

When analyzing different industries (banks, insurance companies, and financial services), the findings reveal that IC significantly influences insurance companies' profitability more than those of banks and financial services. The financial services industry is positively impacted by productivity from VAIC, while efficient IC was more valued by investors in the banking sector. Additionally, SCE positively impacts corporate market value only in the banking sector, and SCE significantly impacts profitability in the financial services sector. In addition, Shariah standard compliance enhances the positive effects of HCE on productivity and SCE on corporate market value.

As for the study's implications for practice, it is recommended that practitioners in financial institutions strategically invest in IC, particularly in human and structural capital, to improve performance and competitiveness. Policymakers are also recommended to promote IC integration in the financial sector by creating a regulatory framework that supports technology adoption, mandatory staff training, and incentives like grants and tax incentives.

As for avenues for future research, it is recommended that researchers further examine the association by incorporating additional tests and control variables, focusing on intangible assets. Future studies could consider longitudinal research to monitor IC's impact over time, explore the relation between VAIC components and other organizational resources, and investigate the influence of Shariah standard compliance on IC strategies.

AUTHOR CONTRIBUTIONS

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REFERENCES

1. Al-Musali, M. A., & Ku Ismail, N. I. (2016). Cross-country comparison of intellectual capital performance and its impact on financial performance of commercial banks in GCC countries. *International Journal of Islamic and Middle Eastern Finance and Management, 9*(4), 512-531. https://doi.org/10.1108/IMEFM-03-2015-0029
2. Ashton, R. H. (2005). Intellectual capital and value creation: A review. *Journal of Accounting Literature, 24,* 53-134. Retrieved from https://www.proquest.com/openview/2a477e326be3dc972907cf34e7af413a/1
3. Castro, J. P. G., Ramírez, D. F. D., & Escobar, J. M. (2021). The relationship between intellectual capital and financial performance in Colombian listed banking entities. *Asia Pacific Management Review, 26*(4), 237-247. https://doi.org/10.1016/j.apmrv.2021.03.002
4. Chan, K. H. (2009). Impact of intellectual capital on organisational performance: an empirical study of companies in the Hang Seng index (part 2). *Learning Organization, 16*(1), 22-39. https://doi.org/10.1108/09696470910927650
5. Chu, S. K. W., Chan, K. H., & Wu, W. W. (2011). Charting intellectual capital performance of the gateway to China. *Journal of Intellectual Capital, 12*(2), 249-276. https://doi.org/10.1108/14691931111123412
6. 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
7. Dalwai, T., & Mohammadi, S. S. (2020). Intellectual capital and corporate governance: an evaluation of Oman's financial sector companies. *Journal of Intellectual Capital, 21*(6), 1125-1152. https://doi.org/10.1108/JIC-09-2018-0151
8. Firer, S., & Williams, S. M. (2003). Intellectual capital and traditional measures of corporate performance. *Journal of Intellectual Capital, 4*(3), 348-360. https://doi.org/10.1108/14691930310487806
9. Gow, I. D., Ormazabal, G., & Taylor, D. J. (2010). Correcting for cross-sectional and time-series dependence in accounting research. *The accounting Review, 85*(2), 483-512. https://doi.org/10.2308/accr.2010.85.2.483
10. Hamdan, A. (2018). Intellectual capital and firm performance: Differentiating between accounting-based and market-based performance *International Journal of Islamic and Middle Eastern Finance and Management, 11*(1), 139-151. https://doi.org/10.1108/IMEFM-02-2017-0053
11. Haris, M., Yao, H., Tariq, G., Malik, A., & Javaid, H. M. (2019). Intellectual capital performance and profitability of banks: Evidence from Pakistan. *Journal of Risk and Financial Management, 12*(2), 56. https://doi.org/10.3390/jrfm12020056
12. Ho, C. A., & Williams, S. M. (2003). International comparative analysis of the association between board structure and the efficiency of value added by a firm from its

http://dx.doi.org/10.21511/bbs.19(3).2024.02

physical capital and intellectual capital resources. *The International Journal of Accounting, 38*(4), 465-491. https://doi.org/10.1016/j.intacc.2003.09.001

13. Hsu, L., & Wang, C. (2010). Clarifying the effect of intellectual capital on performance: the mediating role of dynamic capability. *British Journal of Management, 23*(2), 179-205. https://doi.org/10.1111/j.1467-8551.2010.00718.x

14. Isola, W. A., Adeleye, N. B., & Olohunlana, A. O. (2020). Boardroom female participation, intellectual capital efficiency and firm performance in developing countries: evidence from Nigeria. *Journal of Economics, Finance and Administrative Science, 25*(50), 1-20. http://dx.doi.org/10.1108/jefas-03-2019-0034

15. Itami, H. (1987). *Mobilizing Invisible Assets.* Cambridge, MA: Harvard University Press.

16. Javaherizadeh, E. (2021). *An empirical study on the impact of female leaders and intellectual capital on the financial performance of FTSE 350 companies* (Doctoral Thesis). University of West London.

17. Joshi, M., Cahill, D., Sidhu, J., & Kansal, M. (2013). Intellectual capital and financial performance: an evaluation of the Australian financial sector. *Journal of Intellectual Capital, 14*(2), 264-285. https://doi.org/10.1108/14691931311323887

18. Karacan, S., & Ergin, E. (2011). Intellectual capital and financial performance in the banking sector. *Business and Economics Research Journal, 2*(4), 1-73. Retrieved from https://ideas.repec.org/a/ris/buecrj/0065.html

19. Kaupelytė, D., & Kairytė, D. (2016). Intellectual Capital Efficiency Impact on European Small and Large Listed Banks Financial Performance. *International journal of Management, Accounting and Economics, 3*(6), 367-377. Retrieved from https://dorl.net/dor/20.1001.1.23832126.2016.3.6.2.6

20. Ku Ismail, K. N. I., & Abdul Karem, M. (2011). Intellectual capital and the financial performance of banks in Bahrain. *Journal of Business Management and Accounting, 1*(1), 63-77. Retrieved from https://e-journal.uum.edu.my/index.php/jbma/article/view/8916

21. Mondal, A., & Ghosh, S. K. (2012). Intellectual capital and financial performance of Indian banks. *Journal of Intellectual Capital, 13*(4), 515-530. https://doi.org/10.1108/14691931211276115

22. Nadeem, M., Gan, C., & Nguyen, C. (2017). Does intellectual capital efficiency improve firm performance in BRICS economies? A dynamic panel estimation. *Measuring Business Excellence, 21*(1), 65-85. https://doi.org/10.1108/MBE-12-2015-0055

23. Nawaz, T. (2019). Exploring the nexus between human capital, corporate governance and performance: Evidence from Islamic banks. *Journal of Business Ethics, 157*(2), 567-587. https://doi.org/10.1007/s10551-017-3694-0

24. Nawaz, T., & Haniffa, R. (2017). Determinants of financial performance of Islamic banks: an intellectual capital perspective. *Journal of Islamic Accounting and Business Research, 8*(2), 130-142. https://doi.org/10.1108/JIABR-06-2016-0071

25. 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 and Economics, 28*(4), 3808-3823. https://doi.org/10.1002/ijfe.2620

26. Nawaz, T., Haniffa, R., & Hudaib, M. (2021). On intellectual capital efficiency and shariah governance in Islamic banking business model. *International Journal of Finance & Economics, 26*(3), 3770-3787.

27. Nazir, M. I., Tan, Y., & Nazir, M. R. (2020). Intellectual capital performance in the financial sector: Evidence from China, Hong Kong, and Taiwan. *International Journal of Finance and Economics, 26*(4), 6089-6109. https://doi.org/10.1002/ijfe.2110

28. Nimtrakoon, S. (2015). The relationship between intellectual capital, firms' market value and financial performance: empirical evidence from the ASEAN. *Journal of Intellectual Capital, 16*(3), 587-618. https://doi.org/10.1108/JIC-09-2014-0104

29. Nizar, N. S. (2021). *Islamic Intellectual Capital and Takaful Financial Performance* (Doctoral Thesis). UNS, Sebelas Maret University.

30. Olohunlana, A. O., Odeleye, A. T., & Isola, W. A. (2022). Determinants of the intellectual capital efficiency of listed banks in Nigeria: a DEA approach. *Journal of Business and Socio-economic Development, 3*(1), 86-96. https://doi.org/10.1108/JBSED-07-2021-0100

31. Ozkan, N., Cakan, S., & Kayacan, M. (2017). Intellectual capital and financial performance: A study of the Turkish Banking Sector. *Borsa Istanbul Review, 17*(3), 190-198. https://doi.org/10.1016/j.bir.2016.03.001

32. Petty, R., & Cuganesan, S. (2005). Voluntary disclosure of intellectual capital by Hong Kong companies: examining size, industry and growth effects over time. *Australian Accounting Review, 15*(36), 40-50. https://doi.org/10.1111/j.1835-2561.2005.tb00291.x

33. 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

34. Pulic, A. (2004). Intellectual capital-does it create or destroy value? *Measuring Business Excellence, 8*(1), 62-68. https://doi.org/10.1108/13683040410524757

35. Sardo, F., & Serrasqueiro, Z. (2017). A European empirical study of the relationship between firms' intellectual capital, financial performance and market value. *Journal of Intellectual Capital, 18*(4), 771-788. https://doi.org/10.1108/JIC-10-2016-0105

36. Smriti, N., & Das, N., (2018) The impact of intellectual capital on firm performance: a study of

Indian firms listed in COSPI. *Journal of Intellectual Capital, 19*(5), 935-964 https://doi.org/10.1108/JIC-11-2017-0156

37. Suryani, A. W., & Nadhiroh, A. (2020). Intellectual capital and capital structure effect on firms' financial performances. *Journal of Accounting Research, Organization and Economics, 3*(2), 127-138. Retrieved from https://jurnal.usk.ac.id/JAROE/article/view/17258
38. Tan, H., Plowman, D., & Hancock, P. (2008). The evolving research on intellectual capital. *Journal of Intellectual Capital, 9*(4), 585-608. https://doi.org/10.1108/14691930810913177
39. Teece, D. J. (2000). *Managing intellectual capital: Organizational, strategic, and policy dimensions.* OUP Oxford.
40. Ting, I. W. K., & Lean, H. H. (2009). Intellectual capital performance of financial institutions in Malaysia. *Journal of Intellectual Capital, 10*(4), 588-599. https://doi.org/10.1108/14691930910996661
41. Tran, N. P., & Vo, D. H. (2020). Human capital efficiency and firm performance across sectors in an emerging market. *Cogent Business & Management, 7*(1), 1738832. https://doi.org/10.1080/23311975.2020.1738832
42. Uslu, H. (2020). The role of intellectual capital in financial development: evidence from the banking sector of Turkey. *Competitiveness Review, 32*(2), 230-249. https://doi.org/10.1108/CR-06-2020-0084
43. Watson, A., & Stanworth, J. (2006). Franchising and intellectual capital: a franchisee's perspective. *Entrepreneurship Management, 2*(3), 337-349. https://doi.org/10.1007/s11365-006-0005-0
44. Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171-180. https://doi.org/10.1002/smj.4250050207
45. Xu, J., & Li, J. (2022). The interrelationship between intellectual capital and firm performance: evidence from China's manufacturing sector. *Journal of Intellectual Capital, 23*(2), 313-341. https://doi.org/10.1108/JIC-08-2019-0189
46. Xu, J., & Wang, B. (2018). Intellectual capital, financial performance, and companies' sustainable growth: Evidence from the Korean manufacturing industry. *Sustainability, 10*(12), 4651. https://doi.org/10.3390/su10124651
47. Yen, S. B., Lee, C. A., & Arokiasamy, L. (2019). Review of Empirical Research on Intellectual Capital and Financial Performance in the Banking Sector. *Global Business and Management Research, 11*(1), 538. Retrieved from https://www.proquest.com/openview/b28c39f8d8334dc91a1098d-7fe2065b1/1

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APPENDIX A

Table A1. The impact of intellectual capital and components on firm performance

Dependent Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q
(Intercept)	−0.165**	−0.139	2.491***	0.151	−0.131***	−0.127	2.441***	0.185*
	(0.078)	(0.108)	(0.411)	(0.115)	(0.047)	(0.086)	(0.413)	(0.106)
VAIC	**0.020***	**0.043***	0.008	**0.006***		–		
	(0.003)	**(0.006)**	(0.009)	**(0.002)**		–		
HCE		–			**0.018***	**0.031***	**0.019***	**0.006***
		–						
		–			**(0.003)**	**(0.007)**	**(0.011)**	**(0.004)**
SCE		–			**−0.011****	**0.017***	**0.054****	**−0.020****
		–			**(0.005)**	**(0.010)**	**(0.023)**	**(0.007)**
CEE		–			**0.242****	**0.711****	−0.161	0.070
		–			**(0.035)**	**(0.071)**	(0.155)	(0.059)
LEVG	−0.015	−0.012	0.551***	0.047*	−0.047***	−0.108***	0.567***	0.039*
	(0.014)	(0.026)	(0.085)	(0.026)	(0.012)	(0.031)	(0.087)	(0.023)
SIZE	0.017*	0.016	−0.254***	−0.021	0.015**	0.016	−0.252***	−0.024*
	(0.010)	(0.013)	(0.051)	(0.014)	(0.006)	(0.011)	(0.051)	(0.013)
AGE	−0.000	−0.000	0.003	0.000	−0.000	−0.000	0.002	0.000
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firm-year Observations	637	637	637	637	637	637	637	637
R^2	0.402	0.459	0.717	0.366	0.625	0.729	0.738	0.373
F-Statistic	27.82***	35.24***	103.2***	23.9***	60.91***	97.94***	103***	21.73***
Average VIF	1.945	1.945	1.945	1.945	1.946	1.946	1.946	1.946

Note: Coefficients are followed by standard errors in parentheses. Asterisks indicate significance: * for 10%, ** for 5%, and *** for 1%, using two-tailed tests.

Table A2. Industry-based regression for the impact of intellectual capital on firm performance

Dependent Variable	Bank Sector				Insurance Sector				Financial services Sector			
	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q
(Intercept)	−0.025	−0.126	−0.056	0.116	−0.316*	−0.445	3.264**	−0.605	−0.123	−0.131	0.190	2.981***
	(0.036)	(0.290)	(0.054)	(0.286)	(0.170)	(0.492)	(1.572)	(1.041)	(0.095)	(0.109)	(0.122)	(0.405)
VAIC	**0.004***	**0.081****	0.002	**0.023****	**0.028****	**0.117****	−0.004	−0.006	**0.016****	**0.024****	**0.006****	0.006
	(0.003)	**(0.029)**	(0.002)	**(0.010)**	**(0.008)**	**(0.037)**	(0.017)	(0.025)	**(0.003)**	**(0.004)**	**(0.002)**	(0.006)
LEVG	−0.030	0.385	0.010	0.662**	−0.062	−0.232**	0.634*	0.623***	0.018	0.014	0.069	0.584***
	(0.033)	(0.424)	(0.057)	(0.273)	(0.049)	(0.107)	(0.333)	(0.166)	(0.035)	(0.056)	(0.046)	(0.170)
SIZE	0.006	−0.036	0.009	0.025	0.043*	0.037	−0.427**	0.191	0.012	0.012	−0.017	−0.320***
	(0.004)	(0.063)	(0.006)	(0.032)	(0.024)	(0.068)	(0.199)	(0.138)	(0.013)	(0.015)	(0.017)	(0.059)
AGE	−0.000	0.000	−0.000	0.000	0.000	0.001	0.000	0.002	−0.000	−0.001	−0.001	0.002
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firm-year Observations	149	149	149	149	198	198	198	198	290	290	290	290
R^2	0.273	0.466	0.103	0.476	0.316	0.322	0.414	0.258	0.463	0.467	0.150	0.270
F-Statistic	3.897***	9.063***	1.186	9.420***	6.532***	6.731***	9.994***	4.910***	18.313***	18.622***	3.754***	7.853***

Note: Coefficients are followed by standard errors in parentheses. Asterisks indicate significance: * for 10%, ** for 5%, and *** for 1%, using two-tailed tests.

Table A3. Industry-based regression for the impact of intellectual capital components on firm performance

Dependent Variable	Bank Sector				Insurance Sector				Financial services			
	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q
(Intercept)	0.027	0.098	0.046	0.187	−0.265*	−0.247	3.462**	−0.589	−0.089*	−0.094	0.225**	2.983***
	(0.038)	(0.289)	(0.064)	(0.304)	(0.150)	(0.363)	(1.482)	(1.069)	(0.052)	(0.061)	(0.109)	(0.401)
HCE	0.001	−0.035	−0.009	−0.062	**0.061*** **	**0.251*** **	−0.076	−0.013	0.007	**0.009****	0.002	0.015
	(0.006)	(0.088)	(0.013)	(0.038)	**(0.010)**	**(0.069)**	(0.055)	(0.072)	(0.004)	**(0.004)**	(0.003)	(0.011)
SCE	0.012	0.642	0.041	**0.437***	**−0.069*** **	**−0.370****	0.004	0.019	0.004	**0.010***	−0.009	0.007
	(0.033)	(0.560)	(0.070)	**(0.245)**	**(0.021)**	**(0.172)**	(0.050)	(0.063)	(0.003)	**(0.005)**	(0.006)	(0.023)
CEE	**0.065****	**0.414***	**0.128*** **	0.184	**0.095****	**0.525*** **	**0.660****	0.012	**0.690*** **	**1.011*** **	0.277	−0.519
	(0.028)	**(0.218)**	**(0.030)**	(0.128)	**(0.047)**	**(0.123)**	**(0.296)**	(0.372)	**(0.150)**	**(0.141)**	(0.169)	(0.667)
LEVG	−0.106***	−0.040	−0.147***	0.478*	−0.043	−0.180*	0.425	0.611***	−0.028	−0.054***	0.050	0.627***
	(0.025)	(0.527)	(0.052)	(0.261)	(0.052)	(0.107)	(0.351)	(0.222)	(0.021)	(0.018)	(0.035)	(0.167)
SIZE	0.007*	−0.032	0.011**	0.028	0.033	0.002	−0.440**	0.190	0.008	0.007	−0.021	−0.320***
	(0.004)	(0.061)	(0.005)	(0.031)	(0.022)	(0.049)	(0.186)	(0.141)	(0.007)	(0.008)	(0.015)	(0.059)
AGE	−0.000	0.000	−0.000	0.000	−0.000	0.000	0.001	0.002	0.000	−0.000	−0.000	0.002
	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)	(0.002)	(0.000)	(0.001)	(0.001)	(0.002)
Year fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firm-year Observations	149	149	149	149	198	198	198	198	290	290	290	290
R^2	0.430	0.543	0.418	0.509	0.504	0.653	0.462	0.258	0.707	0.706	0.739	0.374
F-Statistic	6.698***	10.551***	6.367***	9.188***	12.340***	22.808***	10.409***	4.213***	44.177***	43.855***	103.020***	21.732***

Note: Coefficients are followed by standard errors in parentheses. Asterisks indicate significance: * for 10%, ** for 5%, and *** for 1%, using two-tailed tests.

Table A4. Moderating role of Shariah compliance on intellectual capital and firm performance

Variable	ROA	ROE	AUR	Tobin's Q	ROA	ROE	AUR	Tobin's Q
(Intercept)	−0.174**	−0.145	0.149	2.473***	−0.141***	−0.122	0.202*	2.436***
	(0.077)	(0.108)	(0.116)	(0.421)	(0.049)	(0.082)	(0.106)	(0.428)
SHARIAH_COM	−0.005	−0.020	−0.009	−0.079	0.002	−0.026	−0.015	−0.088
	(0.013)	(0.030)	(0.014)	(0.081)	(0.018)	(0.024)	(0.015)	(0.088)
VAIC · SHARIAH_COM	−0.005	0.002	0.002	0.011			–	
	(0.007)	(0.015)	(0.004)	(0.022)			–	
HCE · SHARIAH_COM			–		0.002	0.006	**0.017*** **	−0.038
			–		(0.005)	(0.018)	**(0.005)**	(0.039)
SCE · SHARIAH_COM			–		−0.022	0.015	0.011	**0.103****
			–		(0.025)	(0.030)	(0.016)	**(0.049)**
CEE · SHARIAH_COM			–		−0.128	0.079	**−0.349*** **	0.538
			–		(0.241)	(0.191)	(0.121)	(0.658)
LEVG	−0.025	−0.021	0.043	0.517***	−0.052***	−0.112***	0.043	0.526***
	(0.018)	(0.027)	(0.029)	(0.087)	(0.012)	(0.032)	(0.026)	(0.085)
SIZE	0.020*	0.018	−0.020	−0.246***	0.016**	0.017*	−0.027**	−0.245***
	(0.010)	(0.013)	(0.015)	(0.054)	(0.007)	(0.010)	(0.013)	(0.054)
AGE	−0.000	−0.000	0.000	0.002	−0.000	−0.000	0.000	0.002
	(0.000)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.002)
Year and industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of firm-year Observations	637	637	637	637	637	637	637	637
R2	0.392	0.446	0.706	0.353	0.62	0.721	0.741	0.361
F-Statistic	25.091***	31.173***	90.993***	21.413***	50.49***	79.251***	78.731***	18.082***

Note: Coefficients are followed by standard errors in parentheses. Asterisks indicate significance: * for 10%, ** for 5%, and *** for 1%, using two-tailed tests.

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