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How capital structure affects Islamic and conventional bank profitability: the role of diversification

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Abstract

Purpose – This study examines whether diversification moderates the relationship between capital structure and bank profitability in Islamic and conventional banks in the Middle East and North Africa (MENA) region.

Design/methodology/approach – A sample of 82 MENA banks covering the period 2006–2021 is employed. The generalized method of moments technique is applied to test the hypothesis that diversification moderates the relationship between capital structure and the profitability of Islamic and conventional banks, with particular attention to the COVID-19 pandemic.

Findings – The results indicate that both diversification and capital structure enhance profitability within both banking systems during the pandemic. Furthermore, the findings reveal that diversification moderates the relationship between capital structure and bank profitability. The COVID-19 pandemic exerted a negative impact on the profitability of both Islamic and conventional banks.

Practical implications – This study provides important insights for policymakers, bank managers and regulators, highlighting the importance of designing strategies and regulatory frameworks that promote sound capital structures and income diversification to strengthen bank profitability, especially during crises like COVID-19.

Originality/value – This study contributes to the existing literature by emphasizing the moderating role of diversification, providing a comparative analysis of Islamic and conventional banking systems in the MENA region and capturing the effects of these dynamics during the COVID-19 crisis.

Keywords Capital structure, Diversification, Bank profitability, COVID-19 pandemic, MENA region

Paper type Research article

1. Introduction

The COVID-19 pandemic disrupted banking operations worldwide, causing significant financial instability (Feyen *et al.*, 2021). Yet, banks continue to play a critical role as the primary providers of liquidity insurance (Barattieri *et al.*, 2020), despite challenges about profitability and intermediary roles. In response to the pandemic's repercussions, banks adopted strategies aimed at delivering faster, more cost-effective services. As a result, many shifted toward income diversification and capital structure optimization to reinforce their competitive advantage and improve profitability. These factors become a central theme in banking discourse, as they contribute to enhancing profitability and reducing risk (Wang and Lin, 2021).

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Banks can maintain their intermediary role while preserving profitability, particularly during periods of economic stress. The 2008 financial crisis reignited interest in the role of capital structure, as it substantially influences a bank's resilience to distress. In response, Basel reforms introduced higher capital requirements through the implementation of additional capital buffers, designed to protect depositors and absorb economic shocks. Recent reforms have introduced a minimum leverage ratio to account for both on- and off-balance sheet exposures.

Banks operate within regulatory and supervisory frameworks that often create incentives either to concentrate or diversify their activities. Traditionally, diversification referred to the reallocation of lending portfolios across various geographic regions or loan types (Li *et al.*, 2021), but recently, banks have expanded their diversification efforts by increasing their reliance on non-interest income. These sources may include fees and commissions, trading income, investment returns and other finance-related earnings (Abuzayed *et al.*, 2018; Duho *et al.*, 2020). This strategic shift enables banks to reduce revenue volatility during periods of economic uncertainty, thereby supporting performance (Wang and Lin, 2021). While diversification can enhance stability, some scholars caution that it may also heighten risk (DeYoung and Torna, 2013).

Although conventional and Islamic banks offer similar services, Islamic banks operate under Shariah principles and multiple regulatory frameworks, which often render them less diversified (Bitar *et al.*, 2017a, b). Nevertheless, Islamic banks may develop greater profitability benefits from diversification, although empirical evidence remains inconclusive (Berger *et al.*, 2010). Therefore, this paper investigates the moderating effect of diversification on the relationship between capital structure and profitability in both Islamic and conventional banks in the MENA region, particularly during the COVID-19 pandemic.

The banking industry plays an increasingly vital role in advancing the socioeconomic agendas of countries in the MENA region, becoming more integrated within both national economies and the broader regional financial landscape (El Khoury *et al.*, 2021). However, despite its expanding influence, the region's banking sector has received less scholarly attention compared to those in more developed economies. To address this gap, the present study focuses on MENA countries, where both conventional banks and Islamic banks coexist. This dual banking system offers consumers a diverse range of financial services tailored to varying needs and preferences – from interest-based transactions in conventional banking to profit-and-loss sharing models in Islamic finance (Anouze *et al.*, 2019).

Prior studies have investigated the determinants of profitability in Islamic (Demirgüç-Kunt *et al.*, 2021; Elnahass *et al.*, 2021; Le *et al.*, 2022) and in conventional banks (Cao and Chou, 2022) and both systems in the MENA region (Jarbou *et al.*, 2024). Other research has examined diversification and bank performance (Ho *et al.*, 2023) or intellectual capital in sub-Saharan African banks (Mawutor *et al.*, 2023; Nguyen *et al.*, 2023; Wahyuningtias and Kusumawardhani, 2024). However, the interconnection between capital structure, diversification and profitability remains insufficiently explored, particularly in the MENA region and during a crisis.

This study is conceived to contribute to the banking literature in several ways. First, it fills the gap by examining the moderating effect of diversification on the relationship between capital structure and profitability within both banking systems during the pandemic. Second, it offers a comparative analysis across banking systems in the MENA region, while previous research has predominantly focused on markets such as Vietnam, Indonesia, East Africa and other developed economies, this effect has yet to be explored in the MENA region. Third, it is the first study to employ the interest coverage ratio as financial profitability determinant in this context. Finally, the study contributes to policy discussions by offering practical implications for bank managers and regulators on how to optimize capital structure and diversification strategies enhance financial performance and bank stability.

The structure of the study is as follows: Section 2 presents the literature review; Section 3 describes the data and methodology; Section 4 presents the results and discussions and Section 5 concludes the study.

2. Theoretical framework and hypotheses development

2.1 Islamic and conventional banks' profitability during the COVID-19 pandemic

On the liability side, Islamic banks rely on demand deposits (*Amanah or Qard*), savings deposits and profit-sharing investment accounts (PSIAs), which are structured as profit-and-loss sharing (PLS) agreements and, in adherence to Islamic principles, do not accrue interest. According to Khan (2010), most Islamic banks predominantly engage in non-PLS transactions, while PSIAs are theoretically aligned with equity due to their risk-sharing nature. To remain competitive in financial markets, although PSIAs designed to be interest-free under the PLS principle, Islamic banks often offer returns that closely mirror the interest-based returns of conventional banks (Kuran, 1995; Khan, 2010). Supporting this view, Chong and Liu (2009) found Islamic deposits significantly correlated with conventional deposit rates. Despite their theoretical distinctions, Islamic and conventional banks demonstrate considerable practical convergence.

During the early COVID-19 crisis, bank performance was shaped by financial sector policy announcements. Demirgüç-Kunt *et al.* (2021) investigate how financial sector policy announcements affected bank stock performance, during the early COVID-19 crisis and across 52 countries. They find that liquidity support measures, borrower assistance and monetary easing mitigated the negative impact of the crisis. However, the effectiveness varied across banks and countries. Countercyclical prudential measures were associated with negative abnormal returns, indicating that markets anticipated the potential downside risks of such policies.

In the MENA region, Islamic financial institutions were significantly affected by the economic downturn. El-Chaarani (2023b) analyzes the impact of the COVID-19 pandemic on the performance of Islamic banks and finds that they were significantly affected by the outbreak and its progression. Similarly, Elnahass *et al.* (2021) shows that the crisis substantially undermined bank performance and stability, with differing effects between conventional and Islamic banking models. In contrast, Ghenimi *et al.* (2024) find that Islamic banks performed better and were less risky than conventional counterparts during the pandemic.

Further evidence by Faizulayev (2025) indicates that while conventional banks exhibit greater persistence in financial sustainability, Islamic banks outperform in management efficiency, liquidity and overall stability. This distinction is largely from Shariah-compliant structures, which promote stability through PLS accounts and equity-based risk-sharing mechanisms. The study also reveals that Islamic banks achieve financial resilience more rapidly as they expand, supported by higher capital adequacy and liquidity ratios.

H1. The COVID-19 pandemic has a significant impact on the profitability of both Islamic and conventional banks.

2.2 The relationship between diversification and bank profitability

This study is grounded in several key theories. A firm's diversification strategy involves business expansion aimed at maximizing profit. First, Markowitz's (1952) modern portfolio theory posits that diversification across a range of income-generating activities minimizes risk while maximizing expected returns. In the banking context, as banks diversify their income sources beyond traditional interest-based activities, income diversification increases, reducing overall risk. Second, the agency theory (Denis *et al.*, 1997; Jensen and Meckling, 1976) suggests that managers may pursue diversification strategies to increase their personal

benefits. This behavior often leads to a negative relationship between diversification and firm performance. Empirical research supports this view, showing that firm value tends to decrease as the degree of diversification increases, especially in cases of unrelated diversification (Aggarwal and Samwick, 2003; Berger and Ofek, 1995).

The nature of the relationship between diversification and bank profitability is not yet conclusive and often suggests mixed results. In the context of conventional banks, Lee *et al.* (2014) examined the effect of revenue diversification on the performance across 29 Asia–Pacific countries and found a negative link. Mawutor *et al.* (2023) exhibited same results in Sub-Saharan Africa. Nguyen *et al.* (2023) found that income diversification has a negative effect on the relationship between intellectual capital and bank performance in Vietnamese commercial banks. In contrast, Shahriar *et al.* (2023) analyzed the effect of diversification on the stability of banks operating in the MENA countries and revealed that income diversification tends to enhance stability.

In the case of Islamic banks, Chen *et al.* (2018) argued that they can better capitalize on the benefits of diversification and found that diversification may negatively impact the profitability of Islamic banks in some cases. Conversely, Le *et al.* (2022) demonstrated a positive effect of sectoral diversification of Shariah-compliant financing and income diversification on the performance of Islamic banks.

In comparative studies, Paltrinieri *et al.* (2020) examined the differing effects of revenue diversification on profitability and risk among Islamic and conventional banks across selected Organization of Islamic Cooperation countries. They indicate that diversification leads to relatively smaller profitability gains for Islamic banks; while non-interest income positively affects profitability in both banking models. These results align with earlier research (Abuzayed *et al.*, 2018; AlKhouri and Arouri, 2019).

H2. Diversification positively affects bank profitability.

2.3 The relationship between capital structure and bank profitability

Theory suggests that the choice of capital structure can play a key role in mitigating agency costs. According to the agency cost hypothesis, higher leverage, or a lower equity-to-asset ratio, reduces the agency costs of outside equity and enhances firm value by aligning managerial actions more closely with shareholders' interests. Since the seminal work of Jensen and Meckling (1976), a vast body of literature has explored agency-theoretic explanations of capital structure (Harris and Raviv, 1991; Myers, 2001). Greater financial leverage can discipline managers and reduce agency costs through the threat of liquidation, which entails personal losses for managers in terms of salaries, reputation and perquisites (Williams, 1987). It also exerts pressure to generate sufficient cash flows to cover interest obligations (Jensen, 1986). Moreover, higher leverage can help mitigate conflicts between shareholders and managers regarding investment choices (Myers, 1977), risk-taking behavior (Jensen and Meckling, 1976; Williams, 1987), conditions of firm liquidation (Harris and Raviv, 1990) and dividend policy (Stulz, 1990).

While higher leverage can reduce the agency costs of outside equity, it may simultaneously increase the agency costs of outside debt due to conflicts between shareholders and debt holders. At relatively high levels of leverage, additional borrowing can generate substantial debt-related agency costs, such as risk-shifting behavior or reduced incentives to control risk, which in turn raise the expected costs of financial distress, bankruptcy or liquidation. To compensate for these risks, debt holders demand higher interest payments, thereby increasing firms' financing costs. As noted by Jensen and Meckling (1976), the relationship between leverage and total agency costs is non-monotonic. At low leverage levels, increases in debt improve managerial discipline and reduce overall agency costs by lowering the costs of outside equity. However, beyond a certain threshold-when bankruptcy and financial distress become more probable-the

agency costs of outside debt exceed those of outside equity, and additional leverage ultimately raises total agency costs. Supporting this, Berger and di Patti (2006) found that leverage affects agency costs and thereby influences firm performance.

From the perspective of the resource-based view (RBV) **(**Barney, 1991; Penrose, 1959), capital is considered a critical internal resource that can strategically differentiate a firm from competitors, enabling enhanced performance and profitability. According to RBV, firms gain a competitive edge by acquiring and effectively utilizing resources that are valuable, rare, inimitable and non-substitutable.

Empirical studies support these theoretical perceptions. Bitar *et al.* (2018) and Cao and Chou (2022) found that increased capital positively influences bank performance. Mawutor *et al.* (2023) demonstrated that intellectual capital components positively impact banks' performance, while Nguyen *et al.* (2023) showed that human capital efficiency (HCE), capital employed efficiency (CEE) and structural capital efficiency (SCE) all exert a favorable influence on bank performance. Oanh *et al.* (2023) found that a higher leverage ratio correlates with lower return on assets (ROA) and return on equity (ROE), but positively affects earnings per share (EPS).

In the Islamic banking, Roziq *et al.* (2021) observed that higher capital levels are associated with improved profitability and Ousama *et al.* (2020) found that intellectual capital has a significant positive effect on the financial outcomes. By contrast, El-Chaarani (2023a) showed that capital structure had no significant impact on profitability in Islamic banks. In dual baking context, Jaara *et al.* (2021) analyzed the determinants of profitability for banks operating in GCC countries and found that capital ratio exerts a significant positive impact on the profitability in both Islamic and conventional systems, whereas Tariq (2018) revealed that capital negatively affects the profitability of conventional banks but positively influences Islamic banks.

H3. Capital structure positively affects bank profitability.

2.4 The moderating role of diversification on the capital structure–bank profitability relationship

This section reviews studies examining the moderating role of diversification on the relationship between capital structure and bank profitability – a hypothesis that remains unexplored in the context of Islamic banks.

Sanya and Wolfe (2011) explored the impact of revenue diversification on bank performance and risk in emerging economies. Using a panel dataset banks across 11 countries, they showed that diversification decreases insolvency risk. Banks that diversify their revenue streams experience improved profitability, even though increased reliance on non-interest income may lower risk-adjusted profits. The positive effects of diversification are most pronounced for banks with moderate risk exposures.

Githaiga (2021) explored how income diversification moderates the link between human capital and the performance of 53 banks from 2010 to 2018. The findings conclude that income diversification weakens the beneficial effect of human capital on bank outcomes. In contrast, Nguyen *et al.* (2023) demonstrated that income diversification, when considered as a moderating variable, strengthens the relationship between intellectual capital and financial performance. This result is consistent with Wahyuningtias and Kusumawardhani (2024) who also showed a positive moderating effect.

Despite the existing research on the moderating effect of diversification on intellectual/human capital and financial performance, no study has yet investigated its impact on the relationship between capital structure and financial performance in the context of MENA Islamic and conventional banks. This study seeks to bridge this gap by examining this issue during the COVID-19 pandemic, offering fresh insights into how capital and diversification strategies can be effectively leveraged across both banking systems.

H4. Diversification positively moderates the relationship between capital structure and bank profitability.

3. Methodology

3.1 Data and sample selection

This study focuses on MENA countries with consistent financial reporting from 2006 to 2021. Our primary data sources consist of audited annual financial statements from the Bankscope database, maintained by Bureau Van Dijk. Macroeconomic indicators were retrieved from the World Bank's World Development Indicators database. A rigorous selection process was adopted to ensure data reliability and support robust empirical analysis of bank performance in the MENA region.

The choice of this region is driven by the advanced development and prominence of Islamic banking and enables a focused analysis of its practices in Arab contexts. Due to data availability and quality, the final sample comprises 30 Islamic banks and 52 conventional banks. Only banks classified as fully Islamic (100% Islamic), excluding institutions operating solely Islamic windows within conventional banks. Moreover, banks identified as Islamic by Bankscope but lacking a clear Shariah supervisory board were excluded to ensure the classification integrity.

The exclusion of the 2022–2024 period is motivated by both methodological and data-related considerations. On the one hand, these years were marked by major macroeconomic disruptions, including the post-COVID-19 recovery phase, the onset of the Russia–Ukraine conflict, global interest rate shocks and heightened oil price volatility. These events could create structural breaks in the data, thereby reducing comparability and potentially biasing the panel analysis. On the other hand, standardized and comprehensive financial data for MENA banks beyond 2021 remain limited. Reliable data continues to represent a major challenge in Islamic banking research. Few databases provide comprehensive information, and even prominent sources like Bankscope and Datastream often lack key variables. Consequently, limiting the dataset to 2006–2021 ensures greater consistency in data quality and offers a well-established analytical framework.

3.2 Selected variables: explanation and measurement

The study's selection of variables is guided by a thorough review of recent empirical literature on the drivers of banking performance. In particular, our set of variables closely follows the frameworks employed in key studies such as El-Chaarani *et al.* (2024), Le *et al.* (2022) and Nguyen *et al.* (2023).

3.2.1 Dependent variable. Bank Performance (PROF) is measured using three widely accepted financial indicators: return on assets (ROA), return on equity (ROE) and net interest margin (NIM). ROA is measured as net income divided by total assets, ROE as net income divided by total equity and NIM as net interest income divided by earning assets. These metrics are critical for evaluating a bank's efficiency in generating income from its operations, the effectiveness of resource management and the returns produced relative to its assets and equity.

3.2.2 Independent variables. Income diversification (DIV) serves as both an independent and moderating variable in this study. It is measured by the formula: $1-\left|\frac{\text{net interest income} - \text{other operating}}{\text{total operating income}}\right|$. This metric captures the extent to which a bank's revenue is diversified between interest income – primarily from lending activities – and non-interest income – derived from other financial services and non-lending operations. Given that the COVID-19 pandemic is distinct from the Global Financial Crisis (Duan *et al.*, 2021), the influence of income diversification on bank performance during this period remains an important empirical question.

Capital structure (CAPSTR) reflects the financial resources available to banks to safeguard depositors' interests and ensure operational stability. It is measured by the ratio of Equity to total assets. During the COVID-19 pandemic, Islamic banks with robust capital structures and adequate capital ratios demonstrated greater resilience to adverse financial shocks. To maintain shareholder confidence and distribute dividends, bank managers are incentivized to improve operational efficiency by controlling costs and maximizing profitability.

COVID-19 pandemic (COVID-19) posed a substantial challenge to the global economy. In the MENA region, governments implemented extensive restrictions in 2020 that were necessary for public health but had adverse economic consequences and contributed to heightened banking sector instability during 2020–2021. To capture this impact, we incorporate a dummy variable that takes the value of 1 for the pandemic years and 0 otherwise. Actually, restraint measures like lockdowns led to rising unemployment and widespread business closures, causing pressure on both conventional and Islamic banking systems.

3.2.3 Control variables. Liquidity risk (LR) is measured by the inverse ratio of liquid assets to total assets, capturing the proportion of assets readily available to cover immediate liabilities. To mitigate liquidity risk, financial experts, researchers and regulatory bodies recommend maintaining a minimum level of liquid assets, especially during times of economic uncertainty (Adusei, 2015).

Credit risk (CR) is commonly measured by the ratio of impaired loans to gross loans, reflecting the proportion of loans that are at risk of default. Elevated credit risk typically compels banks to increase provisions for loan losses, which can negatively impact profitability (Dietrich and Wanzenried, 2014; Le and Ngo, 2020). The COVID-19 pandemic had a significant effect on credit risk globally.

Interest coverage ratio (ICR) is calculated as earnings before interest and taxes (EBIT) divided by Interest expense. Serving as a key indicator of financial health, it reflects the cushion available to cover fixed interest payments and acts as a proxy for the firm's capacity to remain solvent and sustain operations (Kim *et al.*, 2013). To our knowledge, this study is the first to employ the interest coverage ratio variable as profitability determinant.

Cost efficiency (CE) is measured by the cost-to-income ratio. During the COVID-19 pandemic, many Islamic banks experienced significant declines in business activities and revenue, yet their operating expenses remained relatively stable. To sustain long-term viability, Islamic banks must implement cost-effective strategies to reduce operational expenses. Salike and Ao (2018) highlight that in times of economic uncertainty, effective cost management becomes crucial in enhancing bank profitability.

Bank size (Size) is considered a key internal factor influencing banks' financial decisions and is measured by the natural logarithm of total assets (Chaibi and Ftiti, 2015). Larger banks often benefit from economies of scale and synergies, which can enhance overall financial performance (Adusei, 2015). During the COVID-19 pandemic, large banks maintained higher customer service standards despite social distancing measures, largely due to their advanced technological infrastructure. Mirzaei *et al.* (2013) highlight that large conventional banks are generally better equipped to manage risks during crises, owing to their diversified portfolios, technological capabilities and competitive advantages.

Gross domestic product (GDP) is measured by the relative real growth rate of GDP. During the COVID-19 pandemic, MENA countries experienced significant GDP contractions due to extended lockdowns and curtailed economic activity. This downturn contributed to a rise in bankruptcies and non-performing loans, thereby negatively affecting bank profitability.

Inflation (INF) is measured by the Consumer Price Index (CPI) and affects consumer behavior and banking activity by reducing purchasing power, which can decline bank revenues. It may also lead to higher lending rates and increases earnings. Overall, studies suggest a negative correlation between inflation and bank profitability (Yao *et al.*, 2018).

3.3 Model specification

Given the unbalanced panel nature of our dataset, the two-step system generalized method of moments (System-GMM) is the most appropriate technique. Conventional estimators, like OLS are unsuitable in this context due to the potential correlation between individual fixed effects and the lagged dependent variable (Nickell, 1981). First, System-GMM (Arellano and Bover, 1995; Blundell and Bond, 1998) corrects for endogeneity arising from the inclusion of lagged dependent variables and other endogenous regressors. Traditional estimators fail to account for such endogeneity, thereby compromising the reliability of the results (Nickell, 1981). It combines equations in levels and first differences to improve. It is well-suited to panels with a short time dimension and a large number of cross-sectional units, which matches the characteristics of our dataset. This method allows for the inclusion of time-invariant variables and controls for unobserved heterogeneity across banks. Second, System-GMM produces consistent and efficient estimates even in the presence of heteroskedasticity, autocorrelation or endogenous regressors. Unlike difference-GMM, which relies only on first-differenced equations, System-GMM combines levels and differences, enhancing efficiency and instrument strength by using lagged levels and differences as instruments. Roodman (2009a) supports the validity of this approach under the assumption of no correlation with fixed effects and Roodman (2009b) notes its superiority over difference-GMM, particularly with unbalanced panels. Third, Blundell and Bond (1998) show that system-GMM performs well with short panels and highly persistent explanatory variables. To ensure robustness, we perform the Hansen test for instrument validity and Arellano–Bond tests for serial correlation. A valid model should reject AR(1) but not AR(2), confirming appropriate instrument specification and absence of second-order autocorrelation.

Given that the primary goal of the current study was to examine the moderating role of diversification in the relationship between capital structure and bank profitability, the following set of GMM estimations is employed:

$$\begin{aligned} PROF_{i,t} = {} & C + \beta_1 PROF_{i,t-1} + \beta_2 DIV_{i,t} + \beta_3 \mathrm{CAPSTR}_{i,t} \\ & + \beta_4 DIV_{i,t} * \mathrm{CAPSTR}_{i,t} + \beta_5 ICRi, t + \beta_6 Covid19 + \beta_7 Size_{i,t} + \beta_8 LR_{i,t} \\ & + \beta_9 CR_{i,t} + \beta_{10} CE_{i,t} + \beta_{11} GDP_{i,t} + \beta_{12} INF_{i,t} + \mathcal{E}_{i,t} \end{aligned} \quad (1)$$

Where i refers to the year and t refers to the bank. $\mathcal{E}_{i,t}$ is the error term.

4. Results and discussion

4.1 Descriptive statistics and correlation analysis

Table 1 reports descriptive statistics, showing that conventional banks reveal higher average profitability (1.52%, vs. 0.66%) and diversification (3.06% vs. 1.84%) than Islamic banks. However, the average capital structure (12.71% vs. 36.8%) and interaction term (38.01% vs. 23.6%) for conventional banks is lower. These findings may be attributed to the impact of the COVID-19 pandemic and that Islamic banks avoid risky assets and conduct transactions based on the principle of profit and loss sharing.

To test for multicollinearity, Tables 2 and 3 present the correlation matrix for the variables included in this study. According to the Gujarati (2009), multicollinearity problems arise when the correlation between variables exceeds 0.8. As shown in Tables 2 and 3, all correlation among the variables are low, with the highest value being 0.76. Therefore, it can be concluded that there is no multicollinearity problem.

4.2 Interpretation of results

According to Table 4, the Hansen test fails to reject the null hypothesis, indicating that the instruments used are valid. Furthermore, the results of the Arellano-Bond test for second-order

Table 1. Descriptive statistics

Variable	Conventional banks Mean	Conventional banks Std. dev.	Islamic banks Mean	Islamic banks Std. dev.
PROF	1.52	2.13	0.66	1.97
DIV	3.06	1.46	1.84	6.1
CAPSTR	12.71	14.23	36.08	100.64
DIV* CAPSTR	23.60	20.24	38.01	347.74
LR	0.10	0.09	0.11	0.08
CR	5.3	8.75	9.19	16.80
Size	4.11	1.003	3.99	1.18
CE	5.99	20.58	2.51	4.67
ICR	20.60	63.36	23.46	64.93
Covid-19	0.125	0.33	0.125	0.33
GDP	4.92	3.89	4.47	4.12
INF	2.04	0.30	1.97	0.39
Obs.	832	832	480	480

Source(s): Table created by authors

serial correlation (AR(2)) confirm the absence of autocorrelation issues, thereby supporting the robustness of the model specifications. The first lag of bank profitability (lagg PROF) is included on the right-hand side of the equation to account for the persistence of profitability and to capture the effects of potentially omitted explanatory variables. The results show that the first lag of profitability is positive and significant in both banking systems, confirming the dynamic nature of bank profitability. Therefore, the model is considered valid.

The results show that the COVID-19 pandemic had a negative impact on the profitability of conventional and Islamic banks, which supports H1 and aligns with the results reported by Elnahass *et al.* (2021) and Le *et al.* (2022). Lockdowns, business closures and social distancing diminished revenues and increased non-performing loans, reducing banks' profitability (Duan *et al.*, 2021; Beck and Keil, 2022). The reduced demand for banking services during periods of economic distress can lead to a decline in non-interest income, weakening banks' profitability (Beck and Keil, 2022). For Islamic banks, the negative impact may be attributed to their unique operational model, which emphasizes the profit-and-loss sharing principle and prohibits speculative activities. Moreover, these institutions are subject to dual oversight by both a conventional board of directors and a Shariah supervisory board, adding layers of governance complexity.

Diversification (DIV) show a positive impact on profitability in both banking systems, regardless of the presence of a health crisis such as the COVID-19 pandemic. This confirms H2, as well as the predictions of portfolio theory argue that diversification maximize the returns of firm. The result is consistent with the findings of Laeven and Levine (2007), Tan (2017) and Le *et al.* (2022). This implies that Islamic banks should increase their degree of diversification through Shariah-compliant financing activities. Conversely, in conventional banks, the positive effect can be explained by increased diversification in traditional borrowing and lending activities, which in turn boosts profitability. Bank managers often adopt a strategy that emphasizes increasing interest income as a means to mitigate potential losses associated with diversification into non-lending activities.

Capital structure (CAPSTR) has a positive and significant effect on profitability (ROA) in both banking systems. A greater capital structure enhances bank profitability, supporting the agency and RBV. This result confirms our H3, as well as the findings of Cao and Chou (2022). This suggests that higher capital levels lead to increased profitability, which may be attributed to cultural values that emphasize solidarity, collaboration between employers and employees. For Islamic banks, the findings can also be explained by the need to maintain a minimum

Table 2. Pairwise correlation matrix: conventional banks

	ROA	DIV	CAPSTR	DIV*CAPSTR	Size	CR	LR	CE	ICR	Covid-19	INF	GDP
ROA	1.0000											
DIV	0.5528*	1.0000										
	(0.0000)											
CAPSTR	0.7373*	−0.7394*	1.0000									
	(0.0000)	(0.0000)										
DIV*CAP-	0.5980*	−0.5184*	0.7348*	1.0000								
STR	(0.0000)	(0.0000)	(0.0000)									
Size	−0.0318	−0.0512	−0.1025*	0.0116	1.0000							
	(0.3600)	(0.1400)	(0.0031)	(0.7390)								
CR	−0.1814*	−0.5246*	0.5307*	0.4664	−0.1499*	1.0000						
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)							
LR	−0.0823*	0.1583*	−0.0672	−0.0840*	−0.1312*	0.1134*	1.0000					
	(0.0176)	(0.0000)	(0.0525)	(0.0154)	(0.0001)	(0.0010)						
CE	−0.3110*	−0.3831*	−0.0858*	−0.0846*	−0.0370	−0.0871*	0.0285	1.0000				
	(0.0000)	(0.0000)	(0.0133)	(0.0182)	(0.2865)	(0.0120)	(0.4119)					
ICR	0.0836*	0.0300	0.0447	0.1147*	0.0836*	0.0874*	−0.0108	−0.1159*	1.0000			
	(0.0158)	(0.3881)	(0.1976)	(0.0009)	(0.0158)	(0.0116)	(0.7564)	(0.0008)				
Covid-19	−0.0140	0.0079	−0.0023	0.0092	0.0048	0.0083	0.0522	−0.0031	0.2087*	1.0000		
	(0.6867)	(0.8194)	(0.9466)	(0.7900)	(0.8901)	(0.8120)	(0.1323)	(0.9280)	(0.0000)			
INF	−0.2504*	0.4992*	−0.2130*	0.1172*	0.1099*	0.1133*	0.1077*	−0.7660*	0.1065*	−0.0045	1.0000	
	(0.0000)	(0.000)	(0.0000)	(0.0007)	(0.0015)	(0.0011)	(0.0026)	(0.0000)	(0.0021)	(0.8961)		
GDP	0.0578	0.0891*	−0.1308*	0.0111	0.0039	−0.1246*	−0.1434*	−0.2426*	0.0785*	−0.0159	0.2383*	1.0000
	(0.0959)	(0.0102)	(0.0002)	(0.7500)	(0.9098)	(0.0003)	(0.0000)	(0.0000)	(0.0236)	(0.6465)	(0.0000)	

Note(s): * denotes significance at 5%
Source(s): Table created by authors

Table 3. Pairwise correlation matrix: Islamic banks

	ROA	DIV	CAPSTR	DIV*CAPSTR	Size	CR	LR	CE	ICR	Covid-19	INF	GDP
ROA	1.0000											
DIV	0.0300	1.0000										
	(0.5115)											
CAPSTR	0.0080	0.0658	1.0000									
	(0.8619)	(0.1503)										
DIV*CAPSTR	0.0543	0.0804	0.6905*	1.0000								
	(0.2352)	(0.0783)	(0.0000)									
Size	0.0896*	0.2306*	0.1390*	0.1566*	1.0000							
	(0.0497)	(0.0000)	(0.0023)	(0.0006)								
CR	−0.0515	0.0385	0.5712*	0.5274*	0.0853	1.0000						
	(0.2600)	(0.4005)	(0.0000)	(0.0000)	(0.0619)							
LR	−0.0621	−0.1746*	−0.0200	−0.0207	−0.0272	−0.2597*	1.0000					
	(0.1744)	(0.0001)	(0.6619)	(0.6609)	(0.5526)	(0.0000)						
CE	−0.0534	0.0035	0.0022	−0.0035	0.0297	0.0624	0.0162	1.0000				
	(0.2429)	(0.9384)	(0.9618)	(0.9395)	(0.5158)	(0.0624)	(0.7226)					
ICR	0.0295	0.0498	0.1051*	0.1175*	0.2359*	0.0742	−0.0506	−0.0136	1.0000			
	(0.5191)	(0.2758)	(0.0212)	(0.0100)	(0.0000)	(0.1044)	(0.2686)	(0.7669)				
Covid-19	−0.0204	−0.0049	0.0215	0.0250	0.0623	0.0127	0.0414	0.1209*	0.2216*	1.0000		
	(0.6562)	(0.9140)	(0.6386)	(0.5852)	(0.1728)	(0.7809)	(0.3650)	(0.0080)	(0.0000)			
INF	−0.1125*	0.5754*	0.1279*	0.1104*	0.2450*	0.1636*	−0.2600*	0.0924*	−0.0265	0.0194	1.0000	
	(0.0137)	(0.0000)	(0.0050)	(0.0155)	(0.0000)	(0.0003)	(0.0000)	(0.0430)	(0.5618)	(0.6714)		
GDP	0.1741*	0.1337*	0.2117*	0.1983*	0.0923*	0.0806	−0.2000*	0.0255	0.0171	−0.0047	0.2970*	1.0000
	(0.0001)	(0.0033)	(0.0000)	(0.0000)	(0.0432)	(0.0778)	(0.0000)	(0.5776)	(0.7086)	(0.9174)	(0.0000)	

Note(s): * denotes significance at 5%

Source(s): Table created by authors

Table 4. Estimation of the system with ROA as profitability measure

Independent variables Dependent variable PERF (ROA)	Islamic banks	Conventional banks
Lag PERF	0.383** (0.028)	0.120*** (0.000)
DIV	0.014*** (0.006)	0.741*** (0.000)
CAPSTR	0.025*** (0.000)	0.497*** (0.000)
DIV*CAPSTR	0.009*** (0.000)	0.174*** (0.000)
Size	0.165*** (0.000)	0.404*** (0.000)
CR	−0.052*** (0.000)	−0.130*** (0.000)
LR	−1.88*** (0.000)	−1.333*** (0.000)
CE	−0.004 (0.181)	−0.090*** (0.000)
ICR	0.003*** (0.001)	0.0005*** (0.000)
Covid-19	−1.575** (0.015)	−0.052*** (0.000)
INF	−0.108 (0.346)	−1.782*** (0.000)
GDP	0.046*** (0.001)	0.044*** (0.000)
Const	−0.893*** (0.000)	0.066 (0.562)
AR(2)	0.02 (0.787)	−0.33 (0.744)
Hansen test	10.77 (0.682)	50.21 (0.241)

Note(s): Hansen-test refers to the over-identification test for the restrictions in GMM estimation. AR (2) test is the test of the second-order autocorrelation in first differences. () indicate *p*-value. ***, **, * denote 1%, 5% and 10% significance levels, respectively

Source(s): Table created by authors

capital level to ensure sufficient funds against uncertainty. Therefore, increased capital improves profitability and provides protection against economic shocks.

The interaction between capital structure and diversification has a positive and significant influence on profitability in both Islamic and conventional banks, supporting H4 and aligning with Githaiga (2021) but contradicting Nguyen *et al.* (2023). This result suggests that managers and employees possess the skills to engage effectively in non-lending activities, thereby enhancing labor productivity and strengthening the capital base. It also implies that managers can allocate capital efficiently, thereby integrating non-lending with traditional lending operations. Finally, this may be attributed to the complementarity between the competencies required for traditional lending and the more versatile skill sets necessary for non-lending operations.

4.2.1 Robustness checks. Evaluating bank profitability through a single metric is inherently challenging (Baselga-Pascual and Vähämaa, 2021). To ensure the robustness of our results, we further investigate whether the main findings persist when using alternative indicators of bank performance. Specifically, we incorporate return on equity (ROE) and net interest margin (NIM) as supplementary measures, applying the system-GMM estimator. As exposed in Table 5, the results confirm the consistency of our initial findings.

5. Conclusion

This study examined the moderating effect of diversification on the relationship between capital structure and profitability in Islamic and conventional banks in the MENA region during the COVID-19 pandemic. The findings indicate that capital structure plays a crucial role in enhancing bank profitability. Moreover, diversification moderates the relationship between capital structure–bank profitability nexus. Specifically, channeling capital in non-

Table 5. Estimation with NIM and ROE

	Islamic banks		conventional banks	
	NIM	ROE	NIM	ROE
Lag NIM	0.637*** (0.000)		0.371*** (0.000)	
Lag ROE	–	0.368*** (0.000)	–	0.123*** (0.000)
DIV	0.0003* (0.062)	0.08* (0.052)	0.089*** (0.000)	1.836*** (0.000)
CAPSTR	0.0005*** (0.000)	0.161*** (0.000)	0.013*** (0.000)	0.969*** (0.000)
DIV*CAPSTR	0.0006*** (0.000)	0.044*** (0.000)	0.004*** (0.000)	0.533*** (0.000)
Size	−0.0006 (0.387)	0.858*** (0.000)	−0.008*** (0.000)	1.91*** (0.000)
CR	−0.0002*** (0.002)	−0.153*** (0.000)	−0.002*** (0.000)	−0.243*** (0.000)
LR	−0.087*** (0.000)	−3.862 (0.335)	−0.067*** (0.000)	−3.374** (0.027)
CE	−0.0073*** (0.000)	−0.0071*** (0.000)	0.002*** (0.000)	−0.279*** (0.000)
ICR	0.0005*** (0.000)	0.0009* (0.093)	0.0002*** (0.000)	0.001*** (0.000)
Covid-19	−0.003*** (0.000)	−0.788*** (0.000)	−0.008*** (0.000)	−0.786*** (0.000)
INF	−0.005 (0.450)	−1.859** (0.033)	−0.152*** (0.000)	−4.961*** (0.000)
GDP	0.0004*** (0.001)	0.187*** (0.000)	0.004*** (0.000)	0.495*** (0.000)
Const	−0.006 (0.635)	1.749 (0.583)	0.11*** (0.000)	−1.262* (0.064)
AR(2)	−1.01	1.10	1.66	−1.16
	(0.314)	(0.271)	(0.096)	(0.245)
Hansen test	24.66	26.66	51.45	50.94
	(0.698)	(0.797)	(0.205)	(0.219)

Note(s): () indicate *p*-value. ***, **, * denote 1%, 5% and 10% significance levels, respectively
Source(s): Table created by authors

traditional banking operations strengthens the direct effect of capital structure on profitability. Despite the challenges posed by the COVID-19 crisis, both Islamic and conventional banks continued to support the economy, highlighting the complementarity roles of capital structure and income diversification.

Our findings yield important implications. First, banks should maintain higher capital levels to enhance profitability, improve risk absorption and increase operational efficiency. Second, MENA banks should diversify their income sources – particularly through non-traditional banking activities – to bolster revenues during crisis periods such as COVID-19. Regulators should promote income diversification among Islamic banks through targeted incentives. This could include the development of a standardized regulatory framework that provides clear guidance on diversification strategies, along with policy support to facilitate their implementation. Finally, Investors can leverage these findings to guide decisions, particularly during periods of economic uncertainty.

This study has diverse limitations. First, data unavailability restricted the analysis to the MENA region; future research could compare regions, countries, or bank sizes. Second, extending the dataset beyond 2021 would provide deeper insights into how Islamic banking models respond to emerging sources of systemic risk and test whether their risk-sharing principles enhance stability under global uncertainty. Third, adding variables, beyond diversification, such as market factors, oil price volatility, risk management or ESG compliance, could enrich the analysis. Finally, in light of the rapid expansion of fintech and digital banking, future studies should explore how technological innovation offers new income streams and enhance efficiency, representing opportunities for sustainable growth.

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