



CAMELS Components and Bank Financial Performance: A Multi-Country Panel Analysis of Middle Eastern Banks

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Received:08/07/2026

Accepted:25/07/2026

Published:01/08/2026

Abstract:

This study examines the relationship between the six CAMELS components and the financial performance of Middle Eastern banks during 2020–2024. Bank financial performance is assessed using return on equity (ROE), return on assets (ROA), return on deposits (ROD), and profit margin (PM). The analysis uses an unbalanced panel dataset comprising 246 bank-year observations from 50 banks across ten Middle Eastern countries. The results show that earnings have a positive and statistically significant relationship with all four measures of financial performance. Capital adequacy is also positive and significant in the ROA, ROD, and PM models, but not in the ROE model. Asset quality has a significant negative relationship only with PM, while management efficiency has a significant positive relationship only with ROA. Liquidity and sensitivity to market risk are not statistically significant at the 5% level in any of the four models. The findings indicate that the importance of individual CAMELS components varies depending on the financial performance measure used. By examining all six CAMELS components across four performance indicators within a multi-country panel framework, the study provides further evidence on CAMELS-based bank performance assessment in Middle Eastern banking systems. The results reflect statistical associations within banks over time and should not be interpreted as causal effects. The scientific originality of this study lies in its comprehensive examination of all CAMELS components across multiple financial performance indicators within Middle Eastern banking systems, providing new empirical evidence on the differential role of each component in explaining bank performance.

Keywords: *CAMELS Framework; Bank Financial Performance; Middle Eastern Banks; Panel Data; Fixed-Effects Model.*

مكونات أنموذج CAMELS والأداء المالي للمصارف: تحليل بيانات لوحية متعددة الدول للمصارف في منطقة الشرق الأوسط

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تاريخ النشر: 2026/08/01

تاريخ القبول: 2026/07/25

تاريخ الاستلام: 2026/07/08

ملخص:

تهدف هذه الدراسة إلى فحص العلاقة بين المكونات الستة لأنموذج CAMELS والأداء المالي للمصارف في منطقة الشرق الأوسط خلال الفترة 2020-2024. وقد تم قياس الأداء المالي للمصارف باستخدام العائد على حقوق الملكية، العائد على الأصول، العائد على الودائع، وهامش الربح. اعتمد التحليل على بيانات لوحية غير متوازنة تضمنت 246 مشاهدة سنوية للمصارف من 50 مصرفاً موزعة على عشر دول شرق أوسطية. وأظهرت النتائج أن الأرباح ترتبط بعلاقة إيجابية ودالة إحصائياً مع جميع مقاييس الأداء المالي الأربعة. كما أظهرت كفاية رأس المال علاقة إيجابية ودالة إحصائياً في نماذج العائد على الأصول، والعائد على الودائع، وهامش الربح، بينما لم تكن دالة في أنموذج العائد على حقوق الملكية. كما ارتبطت جودة الأصول بعلاقة سلبية ودالة إحصائياً فقط مع هامش الربح، في حين ارتبطت كفاءة الإدارة بعلاقة إيجابية ودالة إحصائياً فقط مع العائد على الأصول. ولم تظهر السيولة والحساسية لمخاطر السوق دلالة إحصائية عند مستوى 5% في أي من النماذج الأربعة. تشير النتائج إلى أن أهمية مكونات أنموذج CAMELS تختلف باختلاف مؤشر الأداء المالي المستخدم. ومن خلال دراسة جميع مكونات CAMELS الستة عبر أربعة مؤشرات للأداء المالي ضمن إطار بيانات لوحية متعددة الدول، تقدم الدراسة أدلة إضافية حول تقييم أداء المصارف بالاعتماد على أنموذج CAMELS في الأنظمة المصرفية في الشرق الأوسط. وتعكس النتائج علاقات إحصائية بين المتغيرات داخل المصارف عبر الزمن، ولا ينبغي تفسيرها على أنها آثار سببية. وتتمثل الأصالة العلمية لهذه الدراسة في تحليلها الشامل لجميع مكونات أنموذج CAMELS عبر مؤشرات متعددة للأداء المالي ضمن الأنظمة المصرفية في الشرق الأوسط، بما يوفر أدلة تجريبية جديدة حول اختلاف دور كل مكون في تفسير أداء المصارف.

الكلمات المفتاحية: أنموذج CAMEL؛ الأداء المالي للبنوك؛ بنوك الشرق الأوسط؛ بيانات البانل؛ أنموذج التأثيرات الثابتة.

1. Introduction

Financial uncertainty and the changes in the banking environment following the pandemic have increased academic and regulatory attention to the determinants of bank performance, particularly in light of shifts in risk premiums, funding costs, and supervisory priorities (Abuamria & Ajouz, 2025; Alber & Amin, 2024; Girardone & Ricci, 2023). Banks support the wider economy by directing savings toward productive activities, facilitating the transmission of monetary policy, and distributing financial risk, thereby contributing to economic growth, financial stability, and more efficient capital allocation (Murrar et al., 2024; Piracha et al., 2022). Banks play an especially important role in emerging markets, where limited capital-market development means that businesses and households rely more heavily on bank financing (Murrar et al., 2024; Ullah et al., 2024; Yildirim, 2024).

Assessing bank performance became particularly difficult during 2020–2024, a period in which dependable evaluation was increasingly important. Over these years, the pandemic, inflationary pressures, monetary tightening, and geopolitical instability influenced banks' asset quality, funding structures, and net interest margins across the region (Alber & Amin, 2024; Tran et al., 2022; Vu et al., 2023). Basel III implementation and the recalibration of macroprudential instruments have added a further layer of supervisory pressure, narrowing the room for risk-taking and raising the cost of weak capital or liquidity buffers (Allouche & Hijazi, 2024; Ullah et al., 2024). Under such conditions, single-period profitability ratios are no longer adequate, and multidimensional diagnostic tools linking supervisory dimensions to performance outcomes have acquired renewed urgency (Girardone & Ricci, 2023; Jarbou et al., 2024; Tran et al., 2022).

Among these tools, the CAMELS framework has retained its prominence since the mid-1990s, when sensitivity to market risk was formally added to its original five components (Abdelmoneim & Yasser, 2023; Ledhem & Mekidiche, 2020). Each dimension captures a distinct transmission channel to profitability: capital adequacy sets the loss-absorption buffer that supports depositor confidence; asset quality reflects the composition of the bank's assets and the share committed to fixed operating assets; management quality proxies the institution's capacity to identify, price, and control risk; earnings measure the ability to generate sustainable returns; liquidity governs the cost at which obligations are met; and sensitivity to market risk reflects the bank's potential exposure to changes in market prices and interest rates through its securities portfolio (Abuzarqa & Tarnóczy, 2021; Akhtar et al., 2024; Ledhem & Mekidiche, 2020). The CAMELS framework is widely used by banking supervisors and regulatory authorities worldwide as a comprehensive tool for evaluating bank soundness, and its academic value ultimately depends on whether its components can be linked empirically to profitability indicators across heterogeneous institutional settings (Abdelmoneim & Yasser, 2023; Jarbou et al., 2024; Saeed et al., 2020).

Empirical evidence on this link is substantial yet far from settled. Panel work on Indian commercial banks finds that capital adequacy, liquidity, and sensitivity to market risk have significant effects on both ROA and ROE, while asset quality, management quality, and earnings matter only in selected specifications (Akhtar et al., 2024). Comparable cross-country evidence on MENA banks indicates that CAMEL-based performance indices differ systematically between Islamic and conventional banks and that profitability deviations are jointly explained by bank-specific and macroeconomic determinants (Jarbou et al., 2024; Sobol et al., 2023). Studies covering European and Asian banking systems point to ownership structure, business model, and the macroeconomic regime as the principal moderators of CAMELS–profitability coefficients, with their magnitude and even their sign varying across contexts (Saeed et al., 2020; Sitnicka et al., 2025). Post-pandemic evidence remains thin but converges on the finding that capital adequacy and operating efficiency are the

principal stabilisers of bank soundness under stress, whereas the roles of asset quality and liquidity are more contingent on regulatory and crisis conditions (Aderogba et al., 2025; Mateev et al., 2024).

Despite this body of evidence, four gaps are particularly salient for the present inquiry. First, existing studies concentrate overwhelmingly on a single country, leaving the Middle East under-represented as an integrated empirical setting (Alber & Amin, 2024; Jarbou et al., 2024). Second, few studies employ the full six-component CAMELS specification within a unified panel framework; many restrict the analysis to four or five dimensions (Abdelmoneim & Yasser, 2023; Abuzarqa & Tarnóczy, 2021; Akhtar et al., 2024). Third, rigorous panel evidence covering the post-pandemic window of 2020–2024 is scarce (Aderogba et al., 2025; Vu et al., 2023). Fourth, and methodologically the most consequential, most prior work examines only one or two profitability indicators, leaving open the question of whether individual CAMELS components exert different explanatory power across ROA, ROE, Return on Deposits, and Profit Margin (Akhtar et al., 2024; Sitnicka et al., 2025). Joint estimation across these four indicators matters because each captures a distinct aspect of bank performance—asset productivity, returns to shareholders, deposit profitability, and operational margin—so a single ratio cannot reveal which CAMELS components drive which dimension of profitability (Jarbou et al., 2024; Sitnicka et al., 2025).

Conventional and Islamic banks operate alongside one another in the Middle East, although Islamic banks follow distinct financing arrangements and risk-sharing principles (Abuamria, 2006; Alsharif, 2025; Jarbou et al., 2024; Sobol et al., 2023). Regulatory regimes differ markedly across jurisdictions, ranging from mature Gulf Cooperation Council frameworks to more heterogeneous institutional environments in non-GCC economies, with Basel principles adopted at varying degrees of intensity (Alam et al., 2019; Allouche & Hijazi, 2024). Macroeconomic conditions also diverge widely among oil-dependent rentier economies, fast-growing non-oil markets, and conflict-affected economies, producing substantial cross-sectional variation in funding costs, credit demand, and inflation exposure within a single regional sample (Alber & Amin, 2024; Putri & Sudarmawan, 2024; Ullah et al., 2024). The recent wave of financial-sector reforms and regional integration initiatives further enhances the value of comparative evidence on how CAMELS dimensions translate into profitability differences across the region (Allouche & Hijazi, 2024; Ullah et al., 2024).

Using audited data from 50 banks in ten Middle Eastern countries between 2020 and 2024, this study examines the relationship between the six CAMELS components and four indicators of financial performance: ROE, ROA, ROD, and PM. This study contributes to the existing literature in several important respects. Theoretically, the study provides multi-country evidence on the relationship between the six CAMELS components and bank financial performance in a region where Islamic and conventional banks operate alongside one another. It also identifies which components show the most consistent relationships with the four measures of financial performance (Jarbou et al., 2024; Saeed et al., 2020). Empirically, it draws on a regionally diversified, unbalanced panel of fifty banks observed annually across the post-pandemic recovery window of 2020–2024, using Eikon Refinitiv data (Alber & Amin, 2024). Methodologically, the study examines all six CAMELS components across four measures of financial performance within a panel-data framework. The likelihood-ratio and Hausman tests are used to assess the model specifications, while variance inflation factors are calculated to examine multicollinearity among the explanatory variables (Aderogba et al., 2025; Akhtar et al., 2024; Sitnicka et al., 2025).

From a managerial perspective, examining four measures of financial performance provides a broader basis for evaluating the relationships between individual CAMELS components and bank performance than relying on a single profitability measure. From a policy perspective, the findings may help regulators and central banks interpret these relationships within the specific context of Middle Eastern banking markets (Allouche & Hijazi, 2024; Girardone & Ricci, 2023; Ullah et al., 2024).

The rest of the paper is structured as follows. Section 2 presents the theoretical framework, reviews the relevant empirical literature, and develops the hypotheses. Section 3 explains the sample, variables, data, and econometric methods, while Section 4 reports the results for the four profitability measures. Section 5 discusses the findings and their implications, outlines the study's limitations, and suggests directions for future research.

2. Theoretical Background, Literature Review, and Hypotheses Development

2.1 Theoretical Foundation

This study is anchored in two complementary theoretical frameworks. Financial intermediation theory treats banks as specialised agents that bridge information asymmetries between depositors and borrowers, transform maturities, and convert capital into a productive stream of expected cash flows whose discounted value ultimately determines bank profitability (Murrar et al., 2024; Yildirim, 2024). Under this perspective, bank performance is the empirical outcome of the bank's ability to allocate resources efficiently across intermediation activities. The risk–return perspective reframes bank performance as the equilibrium result of risk-taking decisions shaped by capital adequacy, asset composition, liquidity buffers, management quality, earnings stability, and market-risk exposure, each treated as a distinct facet of the underlying risk–return trade-off that Basel-style regulation has codified since the late 1980s (Allouche & Hijazi, 2024; Tran et al., 2022; Ullah et al., 2024). Integrated within a unified framework, the six CAMELS dimensions capture heterogeneous features of the intermediation-and-risk-taking process, making them analytically natural proxies for the internal, bank-specific determinants of profitability.

A crucial analytical distinction must be drawn at the outset. The CAMELS components represent internal bank-specific conditions over which management has substantial control, while macroeconomic factors constitute external conditions that, although they shape performance, lie outside the bank's direct decision-making (Girardone & Ricci, 2023; Piracha et al., 2022). The two sets of factors interact, but they are conceptually distinct: the present study focuses exclusively on internal CAMELS determinants and does not introduce external macroeconomic regressors into the empirical model. ROA, ROE, ROD, and PM are therefore treated as alternative but complementary empirical measures of the same underlying performance construct, capturing asset productivity, returns to shareholders, deposit profitability, and operational margin respectively (Akhtar et al., 2024; Ledhem & Mekidiche, 2020; Sitnicka et al., 2025). Estimating all four jointly within a unified CAMELS specification yields sharper inferences about which internal determinants drive which dimension of profitability than reliance on any single ratio.

2.2 CAMELS Components and Bank Financial Performance

2.2.1 Capital Adequacy and Bank Financial Performance

Capital adequacy captures the share of equity in total assets and reflects the bank's loss-absorption capacity. The risk–return perspective predicts a non-trivial but theoretically contested effect: well-capitalised banks enjoy lower funding costs and franchise-value benefits that should support performance, yet excess capital may tie up resources that could otherwise be deployed in profitable lending, suppressing returns on equity (Abdelmoneim & Yasser, 2023; Akhtar et al., 2024; Saeed et

al., 2020). The empirical literature reflects this duality. Comparative evidence on Islamic and conventional banks in the MENA region shows that capital adequacy is the dimension with the most consistent effect on CAMEL-based performance indices in the medium term, but its effect on return on equity alone is weaker and more sample-dependent (Jarbou et al., 2024; Ledhem & Mekidiche, 2020). Panel work on Indian and Brazilian banks confirms that capital adequacy affects ROA significantly but has only an occasional effect on ROE once size and crisis controls are introduced (Akhtar et al., 2024; Sitnicka et al., 2025). The GCC post-pandemic literature indicates that the stabilising role of capital intensifies in rising-rate and high-inflation environments, when weak buffers become measurably costly (Mateev et al., 2024), and broader post-crisis evidence from advanced and emerging banking systems corroborates that capital cushions become binding constraints on performance stability when monetary regimes tighten abruptly (Vu et al., 2023). Differences across studies may reflect variations in regulatory environments, study periods, ownership structures, and the measures used to assess financial performance. In the Middle East, where Islamic and conventional banks operate under different institutional arrangements and Basel III requirements have been implemented to varying degrees, the relationship between capital adequacy and financial performance remains empirically inconclusive. A non-directional hypothesis is therefore proposed

H1: Capital adequacy has a significant relationship with bank financial performance.

2.2.2 Asset Quality and Bank Financial Performance

Asset quality is measured as net property, plant, and equipment divided by total assets, following the fixed-assets-based approach used in previous CAMELS research (Abuzarqa & Tarnóczy, 2021). This ratio shows the proportion of the bank's asset base held in fixed operating assets. A higher ratio indicates that a larger share of the bank's resources is committed to relatively fewer liquid assets, which may limit the funds available for lending, investment, and other income-generating activities. However, the direction of the effect also depends on asset definitions used in CAMELS applications (fixed assets versus non-performing financing), which makes the cross-study comparison genuinely contested (Ledhem & Mekidiche, 2020; Sobol et al., 2023). Recent empirical evidence aligns with the negative-effect prediction for non-performing-credit-based proxies, with MENA studies showing that deteriorating credit quality compresses ROA across both Islamic and conventional banks, particularly in elevated-rate environments (Alber & Amin, 2024; Jarbou et al., 2024). The effect on ROE is less uniform: studies covering GCC banks during 2018–2022 report significant negative coefficients, while emerging-market samples sometimes find insignificant results, a divergence attributable to definitional differences and to the relative weight of asset composition versus credit risk in shaping shareholder returns (Abdelmoneim & Yasser, 2023; Aderogba et al., 2025; Vu et al., 2023). Disagreement also arises between Islamic and conventional banks, since profit-and-loss-sharing contracts in Islamic banks partially mitigate credit-risk transmission to earnings, generating a systematically weaker observed link in those institutions (Jarbou et al., 2024; Sobol et al., 2023). For Middle Eastern banks during 2020–2024, the relationship between asset quality and financial performance may depend on how banks allocate their resources between fixed assets and income-generating activities. Since previous studies report mixed findings, the direction of this relationship remains uncertain.

H2: Asset quality has a significant relationship with bank financial performance.

2.2.3 Management Quality and Bank Financial Performance

Management efficiency is measured by dividing administrative expenses by total income. Refinitiv Eikon records administrative expenses as negative amounts, so the ratio also takes negative values. A value closer to zero means that the bank incurs lower administrative costs relative to its income and therefore operates more efficiently. The ratio is consequently expected to have a positive relationship with financial performance.(Abuzarqa & Tarnóczy, 2021; Akhtar et al., 2024; Jarbou et al., 2024). Empirical literature broadly supports this prediction. Panel evidence for Qatar and Kuwait finds a robust negative association between expense intensity and performance metrics, with effects intensifying under greater competitive pressure (Abuzarqa & Tarnóczy, 2021). Comparable evidence on Indian and emerging-economy banks confirms significant negative effects on ROA and, weaker, on ROE (Akhtar et al., 2024; Saeed et al., 2020; Sitnicka et al., 2025). The strength of the management-quality link, however, varies systematically across institutional contexts: it tends to be stronger in conventional banks operating under tighter cost competition than in Islamic banks, where product structure and profit-sharing agreements introduce additional cost rigidities not captured by the cost-to-income ratio (Alsharif, 2025; Sobol et al., 2023). Post-pandemic evidence further indicates that management-quality effects strengthen during crises, when firms with disciplined cost structures better absorb revenue shortfalls (Mateev et al., 2024). Overall, previous studies suggest that the relationship between management efficiency and bank financial performance varies across banking systems and economic conditions. This relationship may become more important during periods of financial pressure, when controlling administrative costs can help banks maintain their profitability. However, the mixed empirical evidence supports the use of a non-directional hypothesis.

H3: Management quality has a significant relationship with bank financial performance.

2.2.4 Earnings and Bank Financial Performance

In the CAMELS framework, the Earnings dimension captures a bank's capacity to generate stable and sustainable income, absorb unexpected losses, strengthen its capital position, support future growth, and maintain financial resilience (Akhtar et al., 2024; Ledhem & Mekidiche, 2020). In this study, earnings capacity is measured as net interest income divided by average earning assets. This ratio reflects the bank's ability to generate net interest income from the assets used in its core income-generating activities. From a risk–return perspective, a stronger earnings position increases internally generated funds, reduces reliance on costly external financing, and may improve different measures of financial performance, including ROA, ROE, ROD, and PM (Abdelmoneim & Yasser, 2023; Jarbou et al., 2024; Saeed et al., 2020). A stable earnings stream may also strengthen the confidence of depositors, creditors, and regulators, creating funding conditions that support bank performance.

It is important to distinguish the CAMELS Earnings component from the dependent profitability measures employed in this study. Although all four dependent variables (ROA, ROE, ROD, and PM) reflect aspects of bank profitability, they do not represent the Earnings dimension of the CAMELS framework. Instead, the Earnings component captures the bank's capacity to generate stable earnings and absorb potential losses, whereas the dependent variables measure realized financial performance from different perspectives. Accordingly, the Earnings dimension is treated as an explanatory variable representing an internal bank-specific condition that may influence, but remains conceptually distinct from, the four profitability measures used as dependent variables

Previous studies generally report a positive relationship between earnings strength and bank financial performance. Evidence from Arab and GCC banks shows that stronger earnings are associated with better performance in both Islamic and conventional banks (Jarbou et al., 2024; Ledhem & Mekidiche, 2020; Saeed et al., 2020). Research covering the post-pandemic period also

indicates that banks with stronger earnings positions were better able to maintain their financial performance during periods of economic pressure (Alber & Amin, 2024; Mateev et al., 2024). Differences across studies mainly reflect the periods examined and the different income structures of Islamic and conventional banks (Alsharif, 2025; Sobol et al., 2023).

H4: Earnings capacity has a significant relationship with bank financial performance.

2.2.5 Liquidity and Bank Financial Performance

Liquidity, measured as operating cash flow relative to total deposits, captures the bank's ability to meet short-term obligations at reasonable cost. The financial intermediation lens predicts a non-uniform effect. Under the cost-channel view, holding excess liquid resources is expensive because liquid instruments typically carry lower yields, suggesting a negative liquidity–performance relationship, particularly for ROA and PM (Akhtar et al., 2024; Sitnicka et al., 2025). Under the funding-stability view, abundant liquidity buffers reduce funding-risk premia, support depositor confidence, and allow banks to avoid fire-sale losses in stress periods, suggesting a positive relationship with all four-performance metrics, especially ROE and ROD (Abu Khalaf & Awad, 2024; Saeed et al., 2020; Tran et al., 2022). Recent empirical evidence reflects this duality. MENA panel evidence reports that liquidity becomes significant only in specific sub-periods or under particular profitability metrics, suggesting that the partial effect of liquidity is sample-dependent (Abdelaziz et al., 2022; Abdelmoneim & Yasser, 2023; Jarbou et al., 2024). Indian evidence finds significant effects of liquidity ratios on both ROA and ROE, moderated by macroeconomic conditions (Akhtar et al., 2024; Sitnicka et al., 2025). GCC post-pandemic evidence shows that liquidity cushions mitigated the decline in bank performance during the COVID-19 stress, lending support to the funding-stability view in crisis periods (AlHassan et al., 2022). The cross-study disagreement appears to be driven by the macroeconomic regime (low-rate expansiveness versus post-2022 tightening), regulatory liquidity requirements (LCR/NSFR implementation), and the institutional environment of the sampled banking system (Allouche & Hijazi, 2024; Ullah et al., 2024). For Middle Eastern banks during 2020–2024, the relationship between liquidity and financial performance may have varied with inflationary pressures, rising interest rates, and broader economic uncertainty. Given the mixed theoretical arguments and empirical findings, the direction of this relationship remains uncertain.

H5: Liquidity has a significant relationship with bank financial performance.

2.2.6 Sensitivity to Market Risk and Bank Financial Performance

Sensitivity to market risk is measured as total securities divided by total assets. The ratio shows how much of the bank's asset base is invested in securities and provides an indication of its exposure to changes in interest rates and market prices. A larger securities portfolio may expose the bank's income and asset values to stronger market fluctuations, especially during periods of inflation and monetary tightening. However, the effect on financial performance depends on the composition of the portfolio and the wider economic environment (Ledhem & Mekidiche, 2020; Ullah et al., 2024; Vu et al., 2023). Studies of European banks during Brexit, COVID-19, and the Russia–Ukraine war found a negative relationship between market-risk sensitivity and bank performance (Aderogba et al., 2025; Vu et al., 2023). Research on GCC banks during 2020–2024 reached similar conclusions as central banks tightened monetary policy (Alber & Amin, 2024; Girardone & Ricci, 2023). In contrast, studies of MENA banks before 2019 found no significant relationship, suggesting that the role of market-risk sensitivity changes with economic and monetary conditions (Abdelmoneim & Yasser, 2023; Jarbou et al., 2024). Two factors may help explain the differences reported across previous studies. First, the relationship between market-risk sensitivity and financial performance may differ

between Islamic and conventional banks because they use different financial contracts and have different levels of exposure to changes in interest rates and market conditions (Alsharif, 2025; Jarbou et al., 2024; Sobol et al., 2023). Second, this relationship may vary with oil-price movements, particularly in GCC and other Middle Eastern banking markets. Previous studies have reported different findings during periods of rising and falling oil prices (Allouche & Hijazi, 2024; Putri & Sudarmawan, 2024). These differences support the use of a non-directional hypothesis.

H6: Sensitivity to market risk has a significant relationship with bank financial performance.

3. Methodology

3.1 Research Design

This study adopts a quantitative analytical research design. Quantitative designs dominate contemporary empirical banking research because they permit systematic estimation of relationships among observable bank-level variables through replicable statistical procedures, and they are particularly well aligned with supervisory frameworks in which the constructs of interest can be operationalised through standardised accounting ratios (Alber & Amin, 2024). The dependent construct in this study, bank financial performance, is measured by return on assets, return on equity, return on deposits, and profit margin; the independent construct is operationalised through the six dimensions of the CAMELS framework. The relative homogeneity of these indicators across jurisdictions enables unbiased cross-bank comparison within a unified analytical framework (Goddard et al., 2004; Nguyen et al., 2020).

Panel data analysis is the appropriate empirical technique because the dataset combines repeated observations on the same cross-section of banks over multiple years. This structure offers several advantages over purely cross-sectional or time-series analyses (Baltagi, 2006; Wooldridge, 2002). Panel estimation can account for persistent differences across banks that are not directly observed, helping to limit potential bias in the estimated coefficients. Second, combining observations across banks and over time, panel data provide more information for estimation, help reduce collinearity among the explanatory variables, and may produce more efficient estimates (Baltagi, 2006; Wooldridge, 2002). Third, panel models can be estimated using pooled ordinary least squares, fixed effects, or random effects, while the Hausman test helps determine whether the fixed-effects or random-effects specification is more appropriate (Hausman, 1978; Wooldridge, 2002).

The CAMELS framework provides a comprehensive approach for evaluating bank financial performance because it integrates the six core dimensions of bank soundness—capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk—which are widely recognised as the primary internal determinants of banking stability and profitability (Basel Committee on Banking Supervision, 1997; Mishkin & Eakins, 2017; Rose & Hudgins, 2013). Analytically, the 2020–2024 window is particularly informative because it captures the simultaneous operation of post-pandemic credit-quality shocks, inflationary pressures, monetary-tightening cycles, and geopolitical tensions, providing a stringent test of the CAMELS-performance nexus under non-stationary macroeconomic conditions rarely examined in single-country MENA banking studies.

3.2 Sample Selection and Data Source

The study population comprises all commercial banks operating across the Middle East region, totaling 288 institutions distributed across ten jurisdictions: the United Arab Emirates, Bahrain, Egypt, Saudi Arabia, Kuwait, Jordan, Qatar, Turkey, Oman, and Palestine. Lebanon, although geographically part of the Middle East, was excluded because comparable audited financial statements covering the entire 2020–2024 period were not consistently available.

A purposive sampling procedure was employed to assemble a regionally diversified, analytically tractable, and institutionally representative sample. From each of the ten included jurisdictions, the five commercial banks with the largest total assets were selected, yielding a sample of fifty banks. This criterion was chosen for three substantive reasons. First, the largest banks in each country account for the major share of national banking-system assets, making their performance economically significant and policy relevant (Athanasoglou et al., 2008; Dietrich & Wanzenried, 2011). Second, these banks provide the most complete and consistently audited annual financial statements throughout the study period, thereby enhancing cross-country comparability. Third, selecting an equal number of banks from each jurisdiction prevents the sample from being dominated by any single country and ensures balanced country representation in the empirical analysis.

The exclusion of the remaining 238 smaller banks was primarily motivated by data availability and reporting consistency. Smaller banks frequently exhibit incomplete financial disclosures or missing observations for variables required to construct the CAMELS indicators consistently throughout the study period. Including such institutions would have reduced data consistency or required data imputation, potentially affecting the reliability of the empirical estimates. Consequently, the selected sample combines the dominant economic importance of systemically significant banks with the availability of comparable audited financial information.

Both conventional and Islamic banks are represented in the sample, consistent with the structure of banking systems across much of the Middle East (Alsharif, 2025; Jarbou et al., 2024). In addition, the selected countries represent diverse regulatory environments, including mature Gulf banking systems, emerging economies, conflict-affected economies, and both oil-dependent and non-oil economies, providing substantial institutional and macroeconomic heterogeneity.

The final dataset used in the econometric analysis consists of 246 bank-year observations covering the period from 2020 to 2024. Four observations were excluded because of missing values in one or more study variables. Consequently, the empirical analysis is conducted using an unbalanced panel dataset, and this dataset is employed in all regression estimations reported in the study.

Data were obtained exclusively from the Refinitiv Eikon professional financial database, accessed through the LSEG platform, which provides standardized audited financial statements for listed and major commercial banks worldwide. Using a single standardized database ensures data consistency across all sampled countries while maintaining reliance on independently audited financial disclosures. The six CAMELS components and the four financial performance indicators were extracted from the audited annual financial statements for each sampled bank over the 2020–2024 period.

Data extraction was performed using Microsoft Excel, and all econometric analyses were conducted using EViews 14. The software was used to estimate pooled ordinary least squares (Pooled OLS), fixed-effects, and random-effects panel models, as well as to perform the Likelihood Ratio test, Hausman specification test, and variance inflation factor (VIF) diagnostics for multicollinearity, which are required for selecting the appropriate panel-data specification and estimating the four CAMELS–financial performance models

3.3 Variable Definitions and Measurement

Bank financial performance is assessed using four measures: return on equity, return on assets, return on deposits, and profit margin. The six CAMELS components serve as the explanatory variables and are measured using accounting-based indicators. Table (1) shows how each variable is calculated.

Table (1): Definition and Measurement of the Study Variables

Variable	Symbol	Measurement
Return on Equity	ROE	Net profit before tax ÷ total equity × 100
Return on Assets	ROA	Net profit before tax ÷ total assets × 100
Return on Deposits	ROD	Net income ÷ total deposits × 100
Profit Margin	PM	Net income ÷ total revenue
Capital Adequacy	CAPITAL	Total equity ÷ total assets
Asset Quality	ASSET	Net property, plant and equipment ÷ total assets
Management Efficiency	MANAGMENT	Administrative expenses ÷ total income
Earnings Capacity	EARNINGS	Net interest income ÷ average earning assets
Liquidity	LIQUIDITY	Net operating cash flow ÷ total deposits
Sensitivity to Market Risk	SENSITIVITY	Total securities ÷ total assets

Note. ROE, ROA, and ROD are reported as percentages. All other variables are expressed as decimal ratios. ASSET shows the proportion of total assets held in net property, plant, and equipment. A higher value indicates a larger share of fixed assets. Administrative expenses appear as negative values in Refinitiv Eikon. As a result, MANAGMENT also takes negative values. Values closer to zero indicate lower administrative expenses relative to income and higher management efficiency.

3.4 Econometric Model

3.4.1 Econometric Specification

Because each of the four profitability measures captures a distinct facet of bank financial performance, the analysis estimates four separate panel regressions, each written as:

$$\begin{aligned}
 ROE_{it} &= \alpha_1 + \beta_{11} CAPITAL_{it} + \beta_{12} ASSET_{it} + \beta_{13} MANAGMENT_{it} + \beta_{14} EARNINGS_{it} \\
 &\quad + \beta_{15} LIQUIDITY_{it} + \beta_{16} SENSITIVITY_{it} + \mu_{1i} + \varepsilon_{1it} \\
 ROA_{it} &= \alpha_2 + \beta_{21} CAPITAL_{it} + \beta_{22} ASSET_{it} + \beta_{23} MANAGMENT_{it} + \beta_{24} EARNINGS_{it} \\
 &\quad + \beta_{25} LIQUIDITY_{it} + \beta_{26} SENSITIVITY_{it} + \mu_{2i} + \varepsilon_{2it} \\
 ROD_{it} &= \alpha_3 + \beta_{31} CAPITAL_{it} + \beta_{32} ASSET_{it} + \beta_{33} MANAGMENT_{it} + \beta_{34} EARNINGS_{it} \\
 &\quad + \beta_{35} LIQUIDITY_{it} + \beta_{36} SENSITIVITY_{it} + \mu_{3i} + \varepsilon_{3it} \\
 PM_{it} &= \alpha_4 + \beta_{41} CAPITAL_{it} + \beta_{42} ASSET_{it} + \beta_{43} MANAGMENT_{it} + \beta_{44} EARNINGS_{it} \\
 &\quad + \beta_{45} LIQUIDITY_{it} + \beta_{46} SENSITIVITY_{it} + \mu_{4i} + \varepsilon_{4it}
 \end{aligned}$$

where ROE, ROA, ROD, and PM are the four alternative financial-performance indicators for bank i in year t ; α is the intercept; β_1 through β_6 are the estimated coefficients capturing the within-bank, over-time association between each CAMELS dimension and bank financial performance; CAPITAL, ASSET, MANAGMENT, EARNINGS, LIQUIDITY, and SENSITIVITY are the six CAMELS components defined in Table 1; μ_i captures unobserved, time-invariant bank-specific heterogeneity; and ε_{it} is the idiosyncratic error term (Alsharif, 2025; Jarbou et al., 2024).

The use of panel regression is appropriate because the dataset of fifty banks observed annually over the 2020–2024 post-pandemic window generates a unbalanced panel of 246 bank-year observations with both cross-sectional and longitudinal dimensions, thereby enabling identification of both between-bank and within-bank variation. Explicit modelling of the unobserved heterogeneity term μ_i is particularly important given that the sampled banks differ systematically in size, ownership, and national regulatory environment; without controlling for μ_i , ordinary least-squares estimates would conflate bank-level fixed characteristics with the effect of the regressors, producing biased and inconsistent coefficients (Alsharif, 2025; Jarbou et al., 2024).

4. Estimation Strategy

The empirical analysis initially considered three alternative panel-data estimators: pooled ordinary least squares (Pooled OLS), the fixed-effects estimator, and the random-effects estimator. The selection of the appropriate estimator was based on formal specification tests applied separately to each of the four estimated equations. The Likelihood Ratio (LR) test was first employed to compare the pooled OLS and fixed-effects specifications (Akhtar et al., 2024; Sitnicka et al., 2025). The test evaluates the null hypothesis that all bank-specific fixed effects are jointly equal to zero. Rejection of the null hypothesis indicates that the fixed-effects model provides a significantly better fit than the pooled OLS model. The Hausman test was applied separately to each equation to choose between the

fixed-effects and random-effects estimators. Under the null hypothesis, the explanatory variables are assumed to be uncorrelated with bank-specific effects, making the random-effects estimator consistent; rejection therefore supports the use of fixed effects (Akhtar et al., 2024; Hausman, 1978; Saeed et al., 2020; Sitnicka et al., 2025). The final model specifications are presented in the empirical results section. Because the fixed-effects specification operates on the within transformation, the estimated β coefficients quantify the within-bank, over-time association between each CAMELS dimension and bank financial performance rather than cross-sectional differences between banks. Accordingly, all coefficients in this study are interpreted as statistical associations within the panel, rather than causal effects, since the research design does not exploit exogenous variation in the CAMELS components. All empirical analyses were conducted using EViews 14.

4.1 Descriptive Statistics

Table (2): Descriptive Statistics of the Study Variables (N = 246 Bank-Year Observations)

Variable	Symbol	Obs.	Mean	Std. Dev.	Min	Max
Capital Adequacy	CAPITAL	246	0.123	0.041	0.035	0.303
Asset Quality	ASSET	246	0.012	0.005	0.000	0.036
Management Quality	MANAGMENT	246	-0.629	0.320	-3.589	-0.001
Earnings	EARNINGS	246	0.133	0.107	0.000	0.529
Liquidity	LIQUIDITY	246	0.040	0.102	-0.833	0.483
Sensitivity to Market Risk	SENSITIVITY	246	0.158	0.111	0.000	0.554
Return on Equity	ROE	246	17.026	14.172	-8.984	73.665
Return on Assets	ROA	246	1.831	1.330	-1.560	8.661
Return on Deposits	ROD	246	1.494	1.110	-1.124	6.733
Profit Margin	PM	246	0.182	0.135	-0.482	0.611

Note. Descriptive statistics are reported for the ten study variables based on 246 bank-year observations. Variable symbols correspond to those used in the EViews 14 econometric analysis. ROE, ROA, and ROD are expressed in percentage terms, whereas the remaining variables are reported as decimal ratios. All values are rounded to three decimal places.

Table (2) summarizes the descriptive statistics for the ten study variables using 246 bank-year observations. Overall, the descriptive statistics reveal sufficient cross-sectional and temporal variation among the sampled banks, providing an appropriate basis for the subsequent panel-data analysis. Among the CAMELS components, capital adequacy and asset quality exhibit relatively limited dispersion, whereas earnings, liquidity, and sensitivity to market risk display comparatively greater variation across the sample. Management efficiency records negative values because Refinitiv Eikon reports administrative expenses with a negative sign. Values closer to zero indicate lower administrative expenses relative to income and greater management efficiency. Regarding the financial performance indicators, ROE exhibits the highest variability, while ROA, ROD, and PM display comparatively lower but still meaningful dispersion. The presence of negative minimum values across all four profitability indicators suggests that some banks experienced periods of weak financial performance during the study period. Overall, the observed variation across the study variables supports the application of panel-data estimation techniques in the subsequent empirical analysis.

4.2 Diagnostic Tests and Model Selection

Table (3): Multicollinearity Diagnostics

Variable	Symbol	VIF	Tolerance
Capital Adequacy	CAPITAL	1.288	0.777
Asset Quality	ASSET	1.310	0.764
Management Quality	MANAGMENT	1.187	0.842
Earnings	EARNINGS	1.301	0.769
Liquidity	LIQUIDITY	1.088	0.919
Sensitivity to Market Risk	SENSITIVITY	1.186	0.843

Note. Multicollinearity is not considered a serious concern when tolerance values exceed 0.10 and VIF values remain below 10.

Table (3) reports the multicollinearity diagnostics for the independent variables included in the regression models. The tolerance values range from 0.764 to 0.919, while the variance inflation factor (VIF) values range from 1.088 to 1.310. All tolerance values exceed the commonly accepted threshold of 0.10, and all VIF values remain well below the critical value of 10. These results indicate that multicollinearity is not a concern in the estimated models, suggesting that the explanatory variables provide sufficiently distinct information for reliable coefficient estimation.

Table (4): Model Selection Tests

Test	ROE	ROA	ROD	PM
Likelihood Ratio (Cross-section F)	11.453 (0.000)	7.368 (0.000)	7.076 (0.000)	11.678 (0.000)
Likelihood Ratio (Cross-section Chi-square)	338.159 (0.000)	261.935 (0.000)	255.467 (0.000)	341.739 (0.000)
Hausman Test	20.992 (0.002)	7.532 (0.275)	28.372 (0.000)	47.861 (0.000)
Final Estimator Used	Fixed Effects	Fixed Effects	Fixed Effects	Fixed Effects

Note. Test statistics are followed by p-values in parentheses. The likelihood-ratio test compares pooled OLS with fixed effects, while the Hausman test compares fixed effects with random effects. Fixed effects are used for all four models to maintain a consistent within-bank analytical framework. However, the Hausman test for the ROA model does not reject the random-effects specification, and this should be taken into account when interpreting the ROA results

Table (4) reports the tests used to select the panel-data specifications for the four financial-performance models. The likelihood-ratio tests reject pooled OLS in all four models, confirming the need to account for unobserved bank-specific effects. The Hausman test supports the fixed-effects specification for the ROE, ROD, and PM models. For the ROA model, however, the test does not reject the random-effects specification. Fixed effects are nevertheless retained for all four models because the analysis focuses on changes within the same banks over time and seeks to control for unobserved bank characteristics that may be related to the explanatory variables. Using the same specification across the four models also allows the estimated relationships between the CAMELS components and the measures of financial performance to be compared consistently.

4.3 Fixed-Effects Regression Results

Table (5): Fixed-Effects Regression Results for Bank Financial Performance

Variables	ROE	ROA	ROD	PM
CAPITAL	-9.190 (0.396)	10.368** (0.000)	19.564** (0.000)	1.175** (0.004)
ASSET	-100.113 (0.152)	1.410 (0.910)	-0.961 (0.976)	-8.595** (0.001)
MANAGMENT	0.481 (0.485)	0.377** (0.002)	0.539 (0.085)	-0.020 (0.432)
EARNINGS	120.127** (0.000)	12.814** (0.000)	15.185** (0.000)	1.145** (0.000)
LIQUIDITY	-0.216 (0.878)	-0.021 (0.932)	1.214 (0.058)	-0.089 (0.088)
SENSITIVITY	-0.281 (0.958)	0.226 (0.812)	0.539 (0.477)	0.313 (0.111)
Constant	3.649* (0.035)	-0.973** (0.002)	-1.698* (0.030)	0.071 (0.264)
R ²	0.986	0.949	0.838	0.873
F-statistic	242.018	64.738	17.817	23.725
Prob (F-statistic)	0.000	0.000	0.000	0.000
Observations	246	246	246	246

Note. Entries report estimated coefficients, with p-values in parentheses. *, ** indicate statistical significance at the 5% and 1% levels, respectively. All models are estimated using the fixed-effects estimator.

Table (5) reports the fixed-effects estimates for ROE, ROA, ROD, and PM. All four models are jointly significant at the 1% level. The R² values range from 0.838 to 0.986, indicating that the models explain a substantial share of the observed variation in financial performance. However, these values reflect the combined contribution of the CAMELS variables and the bank-specific fixed effects and should therefore not be attributed to the CAMELS components alone. The differences in the

estimated coefficients across the four models also indicate that the relationship between each component and financial performance varies according to the measure used.

Earnings is positive and statistically significant in all four models, making it the most consistent CAMELS component across the four measures of financial performance. Capital adequacy is also positive and significant in the ROA, ROD, and PM models, but not in the ROE model. Asset quality has a significant negative relationship with PM, while management efficiency has a significant positive relationship with ROA. Neither liquidity nor sensitivity to market risk is significant at the 5% level in any model.

The results indicate that the relationship between CAMELS components and bank financial performance varies across the four measures. Earnings shows the most consistent relationship, followed by capital adequacy, whereas the other components are relevant only in selected models. These findings reflect changes within banks over time and do not establish causal relationships.

5. Discussion

5.1 Overall Interpretation of the Findings

Table (5) shows that earnings and capital adequacy have the most consistent relationships with financial performance among the Middle Eastern banks included in the study. Earnings is significant in all four models, while capital adequacy is significant in three. The relationships of asset quality and management efficiency are limited to individual performance measures, whereas liquidity and sensitivity to market risk are not significant at the 5% level in any of the models. The following discussion considers these findings in relation to previous CAMELS-based research.

5.1.1 Earnings and capital adequacy in the broader CAMELS evidence

The statistical significance of the earnings component across all four estimated models places the present results within the broader empirical evidence on CAMELS-based banking-sector assessment. Previous studies identify profitability and solvency as central determinants of bank performance, with earnings-related indicators playing a major role in explaining variations in financial outcomes across banking systems (Abdelmoneim & Yasser, 2023; Mehta & Bhavani, 2017). The findings of the present study are consistent with this pattern, indicating that income-generating capacity is the CAMELS component most consistently associated with changes in bank financial performance during the study period.

Capital adequacy also exhibits a relatively consistent relationship with financial performance. The variable is positively and statistically significant in the ROA, ROD, and PM models, although its coefficient is not statistically significant in the ROE specification. This result is broadly consistent with evidence from MENA and Gulf banking systems, where capital adequacy is frequently associated with stronger bank performance, particularly when profitability is measured using asset-based indicators (Al-Musai, 2014; El Hokayem & El Kazzi, 2024).

The variation in the capital-adequacy results across performance indicators also supports the argument that the statistical relationship between capital strength and bank performance depends on the profitability measure employed. Prior studies show that the magnitude and significance of capital-adequacy coefficients may differ across ROE-, ROA-, and margin-based models because each indicator reflects a different aspect of bank financial performance (Al-Sharkas & Al-Sharkas, 2022; Ali & Salameh, 2024). The insignificant coefficient in the ROE model should therefore not be interpreted as evidence that capital adequacy is irrelevant, but rather as an indication that its association with performance is sensitive to the measurement approach.

2.1.2 Selective contributions of the remaining CAMELS dimensions

The remaining CAMELS components have more limited relationships with financial performance. Asset quality is significant only in the PM model, where it has a negative coefficient. Because ASSET represents net property, plant, and equipment as a share of total assets, the result suggests that banks with a larger proportion of fixed assets tend to have lower profit margins. One possible explanation is that allocating more resources to fixed assets leaves a smaller share available for lending and investment activities that generate income directly. Earlier CAMELS research has also used fixed assets relative to total assets as an indicator of asset quality (Abuzarqa & Tarnóczy, 2021).

Management efficiency is significant only in the ROA model, where it has a positive coefficient. Since administrative expenses are recorded as negative values, a MANAGEMENT value closer to zero indicates lower administrative costs relative to income. The result therefore suggests that banks with lower administrative cost burdens tend to achieve higher returns on their assets. No similar relationship is found for ROE, ROD, or PM, indicating that management efficiency is more closely associated with asset use than with the other measures of financial performance. This finding is consistent with evidence linking management efficiency to asset-based measures of bank profitability (Al-Musai, 2014).

Liquidity and sensitivity to market risk are not statistically significant in any of the four models. This finding is consistent with evidence showing that these dimensions often exhibit weaker and less stable associations with bank profitability than earnings and capital adequacy (Al-Musai, 2014). Their lack of significance in the present study does not imply that they are unimportant for bank stability or supervisory evaluation. Rather, it indicates that their short-term statistical association with the selected profitability measures is limited during the study period.

2.1.3 Contribution of the present study

The present study examines all six CAMELS components across four measures of bank financial performance: ROE, ROA, ROD, and PM. Using a unified multi-country panel, it compares these relationships across several Middle Eastern banking systems rather than focusing on one country, a subset of CAMELS components, or a single profitability indicator.

Table (5) shows that earnings is the only CAMELS component linked to all four measures of financial performance. Capital adequacy is significant in the ROA, ROD, and PM models, but not in the ROE model. The other components are significant only in selected models or show no significant relationship. These differences indicate that the role of each CAMELS component depends on the measure used to assess bank financial performance.

5.2 Theoretical Implications

The findings have several implications for understanding the relationship between CAMELS components and bank financial performance. Although the CAMELS framework evaluates banks across six dimensions, the results show that these dimensions are not equally related to financial performance. Earnings is significant across all four performance measures, while capital adequacy is significant in three models. Asset quality and management efficiency are significant only in individual models, whereas liquidity and sensitivity to market risk are not significant at the 5% level in any model. This pattern is consistent with previous research showing that the relevance of individual CAMELS components varies across banking systems and performance measures (Abdelmoneim & Yasser, 2023; El Hokayem & El Kazzi, 2024). The findings therefore support the use of CAMELS as a multidimensional framework in which each component may have a different relationship with bank financial performance.

The second implication relates to the way bank financial performance is measured. Previous CAMELS studies often rely on a single profitability indicator, usually ROA or ROE. The results of this study show that using only one indicator may provide an incomplete picture of the relationships between CAMELS components and financial performance. Capital adequacy, asset quality, and management efficiency have different levels of statistical significance across ROE, ROA, ROD, and PM. Examining several performance measures therefore provides a broader understanding of these relationships than relying on a single indicator (Al-Sharkas & Al-Sharkas, 2022; Ali & Salameh, 2024).

The third implication relates to the Middle Eastern context of the study. By examining banks from ten Middle Eastern countries during 2020–2024, the study provides comparative evidence from a period marked by post-pandemic adjustment, rising interest rates, and wider economic uncertainty. It also extends previous research by examining all six CAMELS components across four measures of financial performance rather than focusing on a single country, a limited group of components, or one profitability measure. The findings show that the relationships between CAMELS components and financial performance vary according to the measure used. This supports the view that CAMELS should be interpreted as a multidimensional framework whose individual components may have different levels of relevance across financial-performance measures.

5.3 Practical and Policy Implications

For bank managers and internal performance-evaluation teams, the findings highlight the value of examining all six CAMELS components alongside more than one measure of financial performance. Earnings and capital adequacy show the most consistent relationships with performance during the study period and may therefore receive particular attention in internal assessments. However, this does not mean that asset quality, management efficiency, liquidity, and sensitivity to market risk are unimportant. These components remain relevant to the overall financial condition of a bank, even though their relationships with the selected performance measures are limited or statistically insignificant in the present analysis. The findings should therefore be used as a supplementary source of information rather than as a basis for assigning fixed managerial priorities.

For banking supervisors and central-bank teams, the findings show the value of considering several financial-performance measures when interpreting CAMELS indicators. An assessment based only on ROA or ROE may overlook relationships that appear when performance is measured using ROD or PM. This is particularly evident for capital adequacy, asset quality, and management efficiency, whose statistical significance varies across the four models. Earnings and capital adequacy provide the most consistent signals during the study period, but the other CAMELS components should still be considered as part of a broader assessment of bank performance and soundness. The results should therefore complement, rather than replace, existing supervisory assessments.

At the broader policy level, the study provides additional evidence from Middle Eastern banking systems during 2020–2024. The results show that the six CAMELS components do not have the same relationship with every measure of financial performance. Earnings and capital adequacy have the most consistent relationships, while the relevance of the other components varies across the four models. This suggests that policymakers and supervisors should consider several financial-performance indicators when interpreting CAMELS-based assessments rather than relying on a single measure. However, because the findings represent statistical relationships rather than causal effects, they should be interpreted alongside other financial, regulatory, and macroeconomic information.

5.4 Limitations and Future Research

The findings should be interpreted in light of several limitations. First, the sample is limited to banks from ten Middle Eastern countries, so the results may not apply to banking systems in other regions. Second, the 2020–2024 period reflects specific economic and monetary conditions, including the post-pandemic recovery and rising interest rates. Third, the study relies on secondary financial data from Refinitiv Eikon, which limits the availability of detailed supervisory and off-balance-sheet information. Fourth, the models include the six CAMELS components but do not control for time-varying macroeconomic and institutional factors, such as economic growth, inflation, interest rates, and regulatory quality. These omitted factors may be related to both the CAMELS variables and bank financial performance. Fifth, the Hausman test does not reject the random-effects specification for the ROA model, although fixed effects are retained to maintain a consistent within-bank framework across the four models. Finally, the estimated coefficients represent statistical relationships within banks over time and should not be interpreted as causal effects.

Future research could extend the analysis in several ways. First, including banks from other regions would show whether the relationships identified in this study are specific to Middle Eastern banking systems. Second, comparing Islamic and conventional banks may reveal whether business models and financial contracts are associated with differences in the relationships between CAMELS components and bank performance. Future studies could also include macroeconomic and institutional variables, such as GDP growth, inflation, interest rates, regulatory quality, and ownership structure. Extending the study period beyond 2024 would make it possible to examine whether the results remain stable under different economic and monetary conditions. Finally, alternative estimation methods, including dynamic panel models and GMM estimators, could be used to address possible endogeneity and assess the robustness of the findings.

6. Conclusion

This study examines the relationship between the six CAMELS components and four measures of bank financial performance: ROE, ROA, ROD, and PM. The analysis uses an unbalanced panel of 50 banks from ten Middle Eastern countries over the period 2020–2024, comprising 246 bank-year observations. Fixed-effects models are estimated separately for each measure of financial performance. By considering all six components across four performance measures, the study provides a broader assessment of CAMELS-related bank performance in the Middle East during the post-pandemic period.

The results show that earnings have the most consistent relationship with bank financial performance, with a positive and statistically significant coefficient in all four models. Capital adequacy is also positive and significant in the ROA, ROD, and PM models, but not in the ROE model. Asset quality has a significant negative relationship with PM, indicating that a larger proportion of fixed assets is associated with a lower profit margin. Management efficiency has a significant positive relationship with ROA. Because administrative expenses are recorded as negative values, this result indicates that values closer to zero, representing lower administrative costs relative to income, are associated with a higher return on assets. Liquidity and sensitivity to market risk are not statistically significant at the 5% level in any of the four models. Overall, the findings show that the relationship between each CAMELS component and bank financial performance depends on the measure used.

Overall, the findings support the use of CAMELS as a multidimensional framework for examining bank financial performance. They also show that no single performance measure provides a complete picture of the relationships between the six components and bank performance. By

drawing on banks from ten Middle Eastern countries, the study adds comparative evidence to the regional banking literature and provides a basis for future research across different institutional and economic settings. Since the analysis identifies statistical relationships rather than causal effects, the results should be interpreted within the sample, period, and model specifications used in the study.

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