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Article

A Methodological Framework and Pilot Econometric Assessment of Islamic Banking Efficiency in Uzbekistan

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Abstract: This study develops a methodological framework for assessing the efficiency of Islamic banking services in Uzbekistan and provides a pilot econometric application using harmonised financial indicators from selected foreign full-fledged Islamic banks. The framework combines profitability, asset quality, capital adequacy, liquidity, operational efficiency, and bank size as conceptually relevant dimensions. Because a sufficiently long Islamic-banking panel for Uzbekistan is not yet available, the empirical component is deliberately limited to a pilot sample for which return on assets (ROA), a comparable asset-quality ratio (AQ), and the cost-to-income ratio (CIR) could be harmonised. Descriptive statistics, correlation analysis, variance inflation factors, and an OLS specification with HC1 heteroskedasticity-robust standard errors are employed. In the 13-observation pilot sample, AQ and CIR are negatively associated with ROA; however, the small sample and cross-country institutional differences preclude causal or generalisable inference. The study therefore treats the estimates as a feasibility test rather than as a forecast for Uzbekistan. Its main contribution is a transparent monitoring architecture that can be re-estimated with fixed-effects, random-effects, and dynamic panel methods once standardised bank-level Islamic-finance data become available in Uzbekistan.

Keywords: Islamic banking efficiency, econometric assessment, asset quality, operational efficiency, Uzbekistan.

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1. Introduction

Over the past several decades, Islamic finance has become one of the fastest-growing segments of the global financial system. According to the ICD–LSEG Islamic Finance Development Report 2025, global Islamic finance assets reached USD 5.98 trillion in 2024, representing annual growth of 21%. This dynamic indicates that Islamic finance is evolving beyond a set of alternative financial services based on religious principles into a major financial system with implications for banking, capital markets, and investment activity [1].

The international literature on Islamic bank performance widely employs indicators such as profitability, liquidity, capital adequacy, credit risk, asset quality, and operational efficiency. Dami and Bouri analysed internal determinants of ROA and ROE using panel data for 22 Islamic banks. Trad, Trabelsi, and Goux examined data for 78 Islamic banks over 2004-2013 using System GMM and showed that bank size and capital are important factors associated with profitability and stability. Alharbi assessed the effects of capital ratios, bank size, and other internal and external factors on profitability using a fixed-effects model for an international panel of Islamic banks [2].

Bank efficiency, however, extends beyond profitability alone. Rosman, Abd Wahab, and Zainol analysed 79 Islamic banks over 2007–2010 using data envelopment analysis (DEA) and identified profitability and capitalisation as important determinants of efficiency. Using data for 74 Islamic and 354 conventional banks, Yanikkaya, Gumus, and Pabuccu demonstrated that profitability dynamics differ by bank type and that the composition of Islamic financial instruments also matters. Bitar, Pukthuanthong, and Walker examined the relationship between capital and liquidity indicators and bank efficiency using 4,123 bank-year observations [3].

In Uzbekistan, the legal framework for Islamic banking was substantially expanded by Law No. O'RQ-1126 of 27 March 2026. Effective from 29 June 2026, the Law introduced into the legal framework separate licensing for Islamic banking activities, an Islamic Finance Council of the Central Bank, Islamic finance instruments, and special tax provisions applicable to Islamic transactions. Alongside the practical introduction of Islamic banking services, these reforms make the rigorous measurement of their economic efficiency increasingly relevant [4].

Although international studies have extensively examined the profitability, risks, and efficiency of Islamic banks, an econometric indicator system adapted to the regular assessment of the efficiency of introducing Islamic banking services in Uzbekistan is still at an early stage of development. Because a sufficiently long panel dataset on Islamic banking in Uzbekistan is not yet available, the experience of foreign Islamic banks can serve as a methodological benchmark. Their estimated coefficients, however, should not be interpreted as direct forecasts for Uzbekistan [5].

Accordingly, the objective of this study is to develop an econometric monitoring framework for assessing the efficiency of Islamic banking services in Uzbekistan and to examine the empirical feasibility of that framework using a small, harmonised benchmark sample of foreign Islamic banks. The pilot estimates are not intended to forecast the performance of Uzbek banks; rather, they identify data requirements, comparability constraints, and an estimation architecture that can be applied once a sufficiently long national panel becomes available [6].

2. Materials and Methods

The study adopts a quantitative econometric approach. Because a sufficiently long historical panel on Islamic banking activities in Uzbekistan has not yet been formed, a pilot benchmark dataset was assembled from official disclosures of Alinma Bank, Dubai Islamic Bank, and Bank Muamalat Malaysia. Only observations for which ROA, an asset-quality measure, and CIR were available under identical or sufficiently comparable definitions were retained. The resulting pilot dataset contains 13 bank-year observations: Alinma Bank , Dubai Islamic Bank, and Bank Muamalat Malaysia. The purpose of this sample is methodological validation, not population-level inference.

Bank	Years	ROA measure	AQ terminology	Primary official source
Alinma Bank	2021–2025	ROA	NPL ratio	Annual Report 2025
Dubai Islamic Bank	2022–2024	ROA	NPF ratio	Annual Report / FY2024 results
Bank Muamalat Malaysia	2020–2024	ROA after tax and zakat	Gross impaired financing ratio	Annual Report 2024

Table 1. Harmonisation audit for the pilot empirical sample.

Variables and Their Economic Interpretation

Symbol	Indicator	Measurement / interpretation	Status in this study
ROA	Return on assets	Reported return on average/total assets, %	Pilot dependent variable
AQ	Asset quality	NPL/NPF/GIFR, retained only when the denominator is financing/loans and the concept is comparable	Pilot explanatory variable
CIR	Cost-to-income ratio	Operating expenses relative to operating income, %	Pilot explanatory variable
ROE	Return on equity	Net profit relative to equity, %	Future robustness indicator
CAR	Capital adequacy	Regulatory capital adequacy ratio, %	Future expanded-panel indicator
LIQ	Liquidity	A consistently defined liquidity indicator (e.g., LCR), where comparable	Future expanded-panel indicator
SIZE	Bank size	ln(total assets) after common-currency conversion or within-country normalisation	Future expanded-panel control

Table 2. Variables in the proposed framework and their role in the pilot analysis.

NPL, NPF, and gross impaired financing ratio (GIFR) are conceptually related but are not assumed to be identical. For the pilot AQ variable, a bank-year is retained only when the reported numerator represents non-performing or impaired financing and the denominator represents the relevant gross financing/loan portfolio. The original bank terminology is preserved in the source audit below. ROE and return on tangible equity (ROTE) are not combined. CAR, liquidity, and SIZE remain part of the proposed full framework, but they are not estimated in the pilot regression because the present 13-observation sample does not support a stable multivariable panel specification with all conceptual determinants.

Econometric Model

For a sufficiently large future panel, the proposed baseline specification is:

$$ROA_{it} = \beta_0 + \beta_1 AQ_{it} + \beta_2 CAR_{it} + \beta_3 LIQ_{it} + \beta_4 CIR_{it} + \beta_5 SIZE_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

where i denotes the bank, t denotes the year, μ_i captures unobserved bank-specific effects, λ_t captures common time effects, and ε_{it} is the idiosyncratic error term. This is the target specification for a future national or expanded international panel. It is not estimated with the present pilot sample.

The present pilot analysis is intentionally parsimonious. It reports descriptive statistics and Pearson correlations, checks multicollinearity using the variance inflation factor (VIF), and estimates ROA on AQ and CIR using ordinary least squares with HC1 heteroskedasticity-robust standard errors. Fixed-effects, random-effects, Hausman testing,

clustered standard errors, and dynamic panel estimators are reserved for a materially larger panel with sufficient within-bank and between-bank variation. This separation prevents the methodological framework from being overstated by a 13-observation pilot sample.

Pilot Empirical Propositions

P1: A deterioration in asset quality (an increase in AQ) is negatively associated with ROA.

P2: An increase in the cost-to-income ratio (CIR) is negatively associated with ROA.

3. Result and Discussion

Preliminary Empirical Sample and Descriptive Statistics

The preliminary test of the methodology was conducted using selected observations from foreign Islamic banks for which ROA, asset quality, and CIR series were available under identical or sufficiently comparable definitions. The pilot sample is not intended to substitute for a comprehensive international panel; its purpose is to assess indicator harmonisation and the proposed regression specification [7].

Indicator	N	Mean	Std. deviation	Minimum	Maximum
ROA, %	13	1.530	0.823	0.210	2.500
AQ, %	13	2.147	1.902	0.830	6.500
CIR, %	13	39.762	12.684	26.100	58.730

Table 3. Descriptive statistics for the pilot sample.

The mean ROA in the pilot sample was 1.53%, while CIR ranged from 26.10% to 58.73% and the asset-quality indicator ranged from 0.83% to 6.50%. The dispersion of these indicators reflects differences in operating models and risk profiles across the selected banks.

Variable	ROA	AQ	CIR
ROA	1.000	0.531	-0.977
AQ	0.531	1.000	-0.643
CIR	-0.977	-0.643	1.000

Table 4. Correlation matrix for the pilot sample.

ROA is strongly negatively correlated with CIR (r = -0.977), while the bivariate correlation between ROA and AQ is positive (r = 0.531). AQ and CIR are moderately negatively correlated (r = -0.643). With only AQ and CIR included as regressors, both VIF values are approximately 1.70, indicating that multicollinearity between the two pilot explanatory variables is not severe. The positive bivariate ROA-AQ correlation and the negative partial AQ coefficient reported below also illustrate why bivariate associations should not be interpreted independently of the multivariable specification [8].

Pilot Regression

Variable	Coefficient	Robust Std. Error	z-statistic	p-value
Constant	4.4813	0.175	25.668	<0.001
AQ	-0.0718	0.029	-2.463	0.014
CIR	-0.0703	0.004	-18.771	<0.001

Table 5. Pilot OLS regression results for ROA (HC1 heteroskedasticity-robust standard errors).

ROA = 4.4813-0.0718AQ- 0.0703CIR

N = 13; R^2 = 0.971; Adjusted R^2 = 0.966.

In the pilot model, the AQ coefficient was -0.0718 and statistically significant at the 5% level (p = 0.014). Holding the other included factor constant, a one-percentage-point

increase in AQ was associated with an average 0.072-percentage-point lower ROA. The CIR coefficient was also negative and statistically significant: a one-percentage-point increase in CIR was associated with an average 0.070-percentage-point lower ROA [9].

These coefficients do not establish causal effects. Given the small sample (N=13), the limited number of banks, and structural differences across institutions, the high R^2 should not be interpreted as evidence of universally strong explanatory power. The results remain a methodological pilot test. Once the international panel is expanded, the model should be re-estimated using fixed effects, random effects, the Hausman test, and clustered or otherwise robust standard errors [10].

DISCUSSION

The preliminary empirical findings indicate that asset quality and operational efficiency should be considered jointly when assessing the profitability of Islamic banks. In the pilot model, deterioration in AQ and an increase in CIR were negatively associated with ROA. These findings should not be interpreted as causal regularities; rather, they represent an initial empirical test of the econometric assessment framework proposed for Uzbekistan [11].

The result for operational efficiency is economically intuitive: a higher CIR indicates that a larger share of operating income is absorbed by operating expenses. Beck, Demirgüç-Kunt, and Merrouche compared Islamic and conventional banks across 22 countries and found that Islamic banks may exhibit lower cost efficiency while simultaneously displaying higher asset quality and capitalisation. This evidence supports the view that efficiency should be assessed not solely through profitability but jointly with cost, risk, and capital indicators [12].

The negative coefficient on the asset-quality indicator is also consistent with banking economics. A rise in problematic financing may place pressure on profitability through higher provisioning costs, potential losses, and constraints on the productive use of resources. Accordingly, when Islamic financing is introduced in Uzbekistan, the quality of financing should be monitored systematically alongside its volume [13].

The relationship of capital and liquidity with efficiency is more nuanced. Bitar, Pukthuanthong, and Walker found that higher capital and liquidity ratios were positively associated with efficiency in both banking models, although the relationship was comparatively weaker for Islamic banks. Bitar, Hassan, Pukthuanthong, and Walker further showed that higher-quality forms of capital were associated with stronger profitability and efficiency, with the relationship being more pronounced among conventional banks. Consequently, high CAR or liquidity should not automatically be interpreted as high efficiency in the Uzbek monitoring framework; instead, the balance between profitability and financial resilience should be assessed [14].

Yanikkaya, Gumus, and Pabuccu showed that the profitability dynamics of Islamic banks differ from those of conventional banks and that the composition of Islamic financial instruments and alternative service channels may also matter for profitability. Therefore, once relevant data become available in Uzbekistan, the portfolio shares of murabaha, ijara, musharakah, mudarabah, and other instruments should gradually be incorporated into the empirical framework [15].

Proposed Assessment Framework for Uzbekistan

Based on the findings, the study proposes monitoring the efficiency of Islamic banking services in Uzbekistan through three blocks: (1) profitability-ROA and ROE; (2) risk and financial stability-NPF/NPL, CAR, and comparable liquidity indicators; and (3) operational efficiency-CIR and, in subsequent stages, product-level profitability and portfolio composition.

Islamic bank efficiency = f(Profitability, Asset quality, Capital, Liquidity, Operational efficiency)

Limitations of the Study

The principal limitation is the deliberately small pilot sample (13 bank-year observations from three institutions). The sample is insufficient for credible bank fixed-effects, random-effects, Hausman, or dynamic-panel inference and does not permit broad generalisation. The banks also operate under different regulatory and macroeconomic environments. Moreover, NPL, NPF, and GIFR are only conditionally comparable and require a documented denominator check. These constraints are addressed by treating the estimates strictly as a feasibility test and by separating the two-variable pilot regression from the broader conceptual model proposed for future Uzbek data.

4. Conclusion

This study develops an econometric and methodological framework for assessing the efficiency of introducing Islamic banking services into the banking system of Uzbekistan. The analysis demonstrates that Islamic bank efficiency should not be measured solely by ROA or ROE; asset quality, capital adequacy, liquidity, and operational efficiency should also be considered within an integrated framework.

The pilot empirical test produced negative partial associations of AQ and CIR with ROA. These coefficients are not presented as causal estimates or as population parameters. Their role is to demonstrate how a harmonised monitoring dataset can be analysed and to reveal the data-quality and specification issues that must be resolved before full panel inference is attempted in Uzbekistan.

As Islamic banking services become operational in Uzbekistan, commercial banks and regulatory authorities should develop a standardised statistical database for Islamic banking activities. The database should consistently report, by bank and year, the volume of Islamic financing, NPF, ROA, ROE, CAR, liquidity, CIR, and the portfolio shares of the principal Islamic financing instruments.

Growth in the volume of Islamic financing should not, by itself, be regarded as evidence of efficiency. If rapid portfolio expansion is accompanied by deterioration in asset quality or a substantial rise in operating costs, long-term efficiency may decline. Policy and managerial decisions should therefore preserve a balance among financing growth, asset quality, profitability, and financial stability.

The scientific contribution of the study lies in proposing an integrated methodology for Uzbekistan that assesses the efficiency of introducing Islamic banking services through the econometric relationships among profitability, asset quality, capital, liquidity, and operational efficiency. Evidence from foreign Islamic banks is treated not as a direct forecast for Uzbekistan but as a methodological benchmark until a national panel dataset becomes available.

Future research should apply the proposed framework to actual panel data from Uzbek banks once a sufficiently long time series has been accumulated, using fixed-effects, random-effects, and dynamic panel techniques. Further work should also examine the effects of individual Islamic financing instruments on bank profitability and risk.

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