







# “Impact of liquidity and operational risks on Jordanian banks’ stability: A comparative study of conventional and Islamic banks”

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# IMPACT OF LIQUIDITY AND OPERATIONAL RISKS ON JORDANIAN BANKS' STABILITY: A COMPARATIVE STUDY OF CONVENTIONAL AND ISLAMIC BANKS

## Abstract

The study examines the impact of liquidity risk and operational risk on the financial stability in both commercial and Islamic banks in Jordan. The study utilizes secondary data covering a period of ten years, from 2012 to 2022, as it offers a holistic and uninterrupted period that includes the key regulatory, economic, and structural changes in Jordan's banking sector. The study employs panel data analysis to assess these relationships. Liquidity risks are measured using the cash-to-asset ratio and the liabilities-to-deposit ratio, while operational risks are assessed through two indicators: the operational cost-to-income ratio and the operational cost-to-total-assets ratio. The findings reveal that the liabilities-to-deposit ratio, as represented by liquidity risk, and the operating cost-to-income ratio, as represented by operational risks, have significant negative impacts on the financial stability of conventional banks, which emphasizes the need for effective cost and liquidity management. In Islamic banks, financial stability improves significantly due to liquidity indicators: higher liabilities-to-deposit ratios and cash-to-asset ratios, highlighting how essential liquidity is. The operational risk indicators have no impact on Islamic banks. Moreover, control variables such as return on assets (ROA) positively influence stability in conventional and Islamic banks. However, the stability of conventional and Islamic banks faces negative influences from their size, which indicates that bigger banks could become exposed to operational risks and financial vulnerabilities. The research demonstrates that financial stability elements operate differently between conventional and Islamic banking systems. Financial institutions, together with governments, need to establish solutions to fill these gaps.

## Keywords

risk management, banking sector, financial stability, comparative study

## JEL Classification

G28, G21, G32

## INTRODUCTION

Financial institutions have a positive impact on states' economic growth; their stability is critical to the functioning of economic and financial systems (Prochniak & Wasiak, 2017). Authorities and central banks have become more aware of the hazards associated with financial institutions and have taken steps to reduce their influence on the banking industry's security (Brandao-Marques et al., 2020). Because financial risks directly affect banks' financial stability, they are linked to investment and banking activities; these risks include liquidity and operational risks (Ghenimi et al., 2017). If banks are unable to manage these risks, they may experience unforeseen and unplanned losses,

which could cause them to fail (Aloqab et al., 2018). One of the most significant threats facing banks is liquidity risk, which indicates the likelihood that the bank will be unable to meet withdrawal or short-term financing requirements. If the bank does not have enough liquid assets to cover these requirements, it may find itself in a critical financial position, resulting in financial distress (Arif & Anees, 2012). Operational risks, which include human errors, systemic failures, and losses resulting from day-to-day operational activities, pose another threat to banks' stability. These risks may lead to unforeseen losses that negatively affect the bank's ability to sustain its operations (Girling, 2022).

The financial stability of banks stands as a foundation for any nation's economic well-being, while conventional banks and Islamic banks jointly maintain this stability (Abid et al., 2019). These risks threaten the long-term existence of financial institutions, so institutions must focus on managing their operational and liquidity risks (Odeh & Azam, 2021). Financial institutions achieve stability through their efficient risk management, which enables them to explore new markets and boost their performance levels and profitability (Ismail & Ahmed, 2023). Apprehending the dynamics is fundamental for both decision makers and managers of the bank, as the findings will guide steps taken towards improving risk management. The study can also support policies that aim to increase the liquidity and operational risk preparedness of the Jordanian banking sector and protect the financial stability of the economy.

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## 1. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The stability of banking institutions is critical to the overall health of the financial system. Understanding the influence of liquidity and operational risks on financial stability is critical for regulators and financial executives. This section covers the impact of both operational risk and liquidity on commercial banks. A range of studies have been utilized to investigate operational risks and liquidity in conventional banks.

Some studies used multiple linear regression. There were different results for the impact of both liquidity and operational risks (Suryaningsih & Sudirman, 2020; Astanggi & Baskara, 2025; Fadun & Oye, 2020; Mergu & Rao, 2020). Suryaningsih and Sudirman (2020) analyzed the data of their study using multiple linear regression. The findings revealed that profitability was negatively influenced by the credit risk and the operational risk. On the one hand, the outcomes of the liquidity risk analysis influence profitability positively. Astanggi and Baskara (2025) used multiple linear regression analysis; the results show that there exist credit risk, liquidity risk, and operational risk, which impact profitability concurrently. The results of the partial test show that there are no results of credit risk, liquidity risk, operational risk,

or a change in profitability. Fadun and Oye (2020) applied a linear multiple regression model to analyze risks in Nigerian conventional banks using secondary data. Liquidity risk requires attention; credit risk negatively impacts stability; and operational risk indirectly influences overall stability. Mergu and Rao (2020), through multiple linear regression analysis, evaluated operational risk management practices between Ethiopian conventional banks and their Indian counterparts using secondary data and questionnaire responses. The risk management procedures of Ethiopian banks fall into an average category, while Indian banks display proficient levels of risk management.

Moreover, studies have used panel data, and there have been diverse results (Mudanya & Muturi, 2018; Muriithi & Muigai, 2017; Anh & Phuong, 2021). Mudanya and Muturi (2018) utilized panel data estimation techniques to analyze Nairobi's conventional banks. Results found that bank profitability faced a robust adverse relationship with market, liquidity, credit, and operational risks. The results indicated that higher risk levels always decreased profitability. Muriithi and Muigai (2017), employing panel data methodologies on Kenyan conventional banks, including random effects and GMM, discovered an adverse relationship between cost-income and profitability. Effective cost management is critical to both long-term and short-term profitability. Anh and Phuong (2021) investigated Vietnamese conventional banks through dif-

ferential GMM (DGMM) techniques to discover that rising non-performing loans reduced financial stability. The equity-to-assets ratio, together with return on equity, bank size, and macroeconomic conditions, influenced financial stability levels.

Other studies used questionnaires to investigate conventional banks in operational risk (Isoh et al., 2020; Lyambiko, 2016; Shakya & Kuchanur, 2021; Falih et al., 2022; Cheng et al., 2020). Isoh et al. (2020) evaluated structural equation modeling (SEM) analysis based on questionnaires from Cameroonian conventional banks, showing that effective internal operational risk management, with its components of risk monitoring and control, together with training and reporting, improves financial outcomes. Lyambiko (2016), using questionnaires on Tanzanian conventional banks, revealed that credit risk and insolvency risk, together with operational efficiency, directly affected financial performance throughout the study period. Shakya and Kuchanur (2021) used questionnaires on public and private sector banks in India and confirmed that operational risk has a substantial influence on banks' profitability, reputation, and market value, where profitability suffers the most damage. The occurrence of operational risk events produces minimal influence on customer loyalty levels. Falih et al. (2022) showed that operating risk management effectively leads to better financial outcomes for Iraqi conventional operations. Cheng et al. (2020) used PLS-SEM methods, finding positive correlations between credit and liquidity risks with profitability, while operational risks had an adverse impact on conventional banks in South Africa.

Additionally, some studies applying panel data studied the impact of liquidity risks on conventional banks (Amara & Mabrouki, 2019; Ismail & Ahmed, 2023; Alim et al., 2021; Leykun, 2016). Amara and Mabrouki (2019) utilized the generalized method of moments (GMM) to analyze conventional banks in Tunisia. The findings indicate a lack of a clear reciprocal or time-lag relationship between credit risk and liquidity risk. However, each risk independently impacts bank stability, and their combination intensifies instability. Ismail and Ahmed (2023) applied a panel data study of Jordanian conventional banks, which reveals liquidity risk to be a vital risk management element that does not pro-

duce direct influences on financial stability. The financial system's stability depends heavily on effective credit risk management because of its negative impact on system stability. Alim et al. (2021) used a panel data study on Pakistani conventional banks. The results may be a useful guide for future policy choices regarding the minimum amount of liquidity that banks in the area must maintain. Leykun (2016), through classical linear regression, showed that not having enough capital has an adverse influence. It was found that loans, savings, and the total amount of assets and debt did not match up. Bank management should first look into liquidity gaps and contemplate other ways to acquire money, like issuing conventional paper, in addition to account financing.

Previous literature is reviewed to interpret the impact of operational risks on the financial stability and performance of Islamic banks. Moreover, the review examines the impact of liquidity risks on the Islamic banks, particularly depending on the Sharia-compliant financial products. Some studies have examined the impact of both operational risks and liquidity risks using a multiple linear model (Imran et al., 2021; Rasul, 2013; Onyekwelu et al., 2018). Imran et al. (2021), in a study of Islamic banks in Pakistan, employed a multiple linear model and found that the ratio of total operating costs to total operating income was negatively but significantly correlated with the ratio of net interest income to average productivity of assets. Rasul (2013) argued that the success of Islamic banking depends heavily on investments in assets (INVSTA) and deposits (INVSDEP). The relationship between ROE and liquidity remains weak, yet there exists a significant correlation between returns on assets (ROA) and return on deposits (ROD) at the 1% level. According to the research findings, these banking institutions need effective cash management to generate profits. Onyekwelu et al. (2018) employed multiple regression analysis on Islamic banks in Nigeria, and the results indicated that liquidity had a favorable and substantial influence on banks' profitability metrics, including Return on Capital Employed (ROCE).

Moreover, some studies have used pooled ordinary linear (Anjom & Faruq, 2023; Mustafa, 2020). Anjom and Faruq (2023), using pooled ordinary linear regression (OLS) research conducted in

Bangladesh on Islamic banks, revealed major parameters impacting financial stability. The results emphasize the importance of capital sufficiency, profitability, and careful management of non-performing assets in ensuring stability. Mustafa (2020), using ordinary least squares (OLS) methodology on Islamic banks in Sudan, shows that financial performance deteriorates when current deposits exceed total deposits, total financing surpasses total deposits, and when inflation rises. The ratio of liquid assets to total assets positively influences performance, while other ratios have a negative impact on it. The increase in money supply through monetary policy created an indirect risk of liquidity shortage for Islamic banks.

Some other scholars used panel data regression and showed that liquidity risks have a positive impact on the profitability of Islamic banks (Yaacob et al., 2016; Al-Husainy & Jadah, 2021). Yaacob et al. (2016) used panel data regression to investigate Islamic banks in Malaysia and discovered a correlation between liquidity risk and other bank attributes, including financing and the capital adequacy ratio. Al-Husainy and Jadah (2021) adopted a dynamic panel model in their paper, which is based on the Generalized Methods of Moments (GMM) data regression. Moreover, the results depict that there is a significantly positive relationship between liquidity risk and bank profitability. Meanwhile, there is a significant negative correlation between credit risk and bank profitability.

In addition, some studies have used different methodologies to explore the impact of operational risks and liquidity in Islamic banks (Abdullah et al., 2011; Kaharuddin & Yusuf, 2022; Masood & Javaria, 2017; Tabash, 2018; Hamisu et al., 2016). Abdullah et al. (2011) used descriptive, analytical, and comparative analyses in their study to emphasize the unique features of Islamic banks and cast doubt on the Basel II methodology's suitability for them. Due to these special characteristics, there are questions concerning how well standard banking laws can be adapted to the Islamic financial system. Kaharuddin and Yusuf (2022), using the Z-score in a study of Islamic banks in Indonesia, discovered that financial risk has a direct influence on bank stability. Credit risk and operational efficiency also play a role in this relationship. However, operational efficiency does not have a direct in-

fluence on the stability of a bank. Masood and Javaria (2017) showed that maintaining optimal liquidity levels improves financial performance, but excessive liquidity might have a negative impact. The research emphasizes the need for good liquidity management to enhance performance. Tabash (2018), using regression and correlational models, determined that tangibility ratios together with capital adequacy measures constitute the essential elements for managing liquidity risk in Islamic banks within the United Arab Emirates. Islamic financial institutions possess strong and positive connections between their asset size and capital adequacy and liquidity risk levels. Hamisu et al. (2016) investigated Islamic banks in Malaysia using the Z-score analysis. Islamic banks can effectively mitigate disruptions and prevent imminent financial difficulties by meticulously monitoring loan-to-deposit ratios and liquidity ratios.

Previous literature predominantly focuses on liquidity risk rather than operational risk. Research on the financial stability of both commercial and Islamic banks reveals a significant gap. Therefore, there is a need for a study that compares how Islamic and conventional banks manage liquidity and operational risks, as well as how these management strategies impact financial stability; this study will help fill the existing gap in knowledge.

After reviewing the literature, this study aims to study the impact of both liquidity and operational risks on Islamic and conventional banks in Jordan; therefore, the main hypotheses used to assess the relationship between operational and liquidity risk in conventional and Islamic banks and financial stability are as follows:

$H_1$ : *Operational and liquidity risks have no statistically significant influence on the financial stability at the significance level ( $\alpha \leq 0.05$ ) of Jordanian conventional banks listed on the Amman Stock Exchange during the period 2012–2022.*

$H_2$ : *Operational and liquidity risks have no statistically significant influence on the financial stability at the significance level ( $\alpha \leq 0.05$ ) of Jordanian Islamic banks listed on the Amman Stock Exchange during the period 2012–2022.*

## 2. METHOD

### 2.1. Data sources

The study was based on secondary data. Analysis was performed to obtain the financial statements of the Jordanian commercial and Islamic banks in the sample using the Amman Stock Exchange website ([www.ase.com.jo](http://www.ase.com.jo)). The study also gathered additional relevant information needed from the official websites of the respective banks (See Appendix A).

### 2.2. Study population and sample

The annual reports provided data, which enabled an evaluation of liquidity risk and operational risk on the stability of Jordanian Islamic and conventional banks between 2012 and 2022. The study included a comprehensive analysis of 15 banks, comprising 12 conventional Jordanian banks and 3 Islamic Jordanian banks, all of which maintained a consistent listing on the Amman Stock Exchange during the study period (See Appendix A).

### 2.3. Variables measuring

The variables used in the analysis, along with their definitions and measurement methods, are presented in Table 1. The Z-score serves as the primary measure of financial stability, which represents the dependent variable. The study

examines two independent variables: liquidity risk and operational risk. The liquidity risk assessment consists of two measures that use the cash-to-asset ratio (CTA) and the liabilities-to-deposit ratio (LDR). The operational cost-to-income ratio (OCI) and operational cost-to-total assets ratio (OCA) serve as the measurement tools for operational risks. The study incorporates ROA as a profitability indicator, and bank size as the logarithm of total assets as control variables. The study accounts for other factors that may influence financial stability to maintain the reliability of the study results.

### 2.4. Econometric methodology

The study evaluated the impact of liquidity risk and operational risk effects on the financial stability of Islamic and conventional banking in Jordan using panel data. The study period spanned ten years. The study's hypotheses were analyzed through panel data regression models that incorporated random effects and fixed effect models, as well as pooled OLS. The Lagrange multiplier test allowed us to determine which model should be chosen: a random effects model or a fixed effects model. The Hausman test reveals differentiating characteristics between random effects and fixed effects. Regression models should employ either pooled OLS or fixed effects models based on the results of the cross-section F-test.

**Table 1.** Variables description

Variables	Definitions	Measures	Sources
Dependent variable	Financial Stability	$Z - Score = \frac{ROA + ETA}{\sigma ROA}$	Chai et al. (2022)
Independent variable	Liquidity Risk	$Cash\ to\ Asset\ Ratio = \frac{Cash\ and\ Cash\ Equivalents}{Total\ assets}$	Salah and Mobarak (2020)
Independent variable	Liquidity Risk	$Liabilities\ to\ Deposit\ Ratio = \frac{Total\ Liabilities}{Total\ Deposits}$	Salah and Mobarak (2020)
Independent variable	Operational Risks	$Operational\ Cost\ to\ Income = \frac{Operating\ Costs}{Net\ Income}$	Muthia et al. (2019)
Independent variable	Operational Risks	$Operational\ Cost\ to\ Total\ Assets = \frac{Operating\ Costs}{Total\ Assets}$	Muthia et al. (2019)
Control variable	ROA	$Return\ on\ Assets = \frac{Net\ Income}{Total\ Assets}$	Chai et al. (2022)
Control variable	Size	$Logarithm\ of\ Total\ Assets$	Chai et al. (2022)

The study model was built based on the study:

$$\begin{aligned}
 FS_{\text{conventional banks}} &= \alpha + \beta_1 CTA_{it} \\
 &+ \beta_2 LDR_{it} + \beta_3 OCI_{it} + \beta_4 OCA_{it} \\
 &+ \beta_5 ROA_{it} + \beta_6 SIZE_{it} + \varepsilon_{it},
 \end{aligned} \tag{1}$$

$$\begin{aligned}
 FS_{\text{Islamic banks}} &= \alpha + \beta_1 CTA_{it} \\
 &+ \beta_2 LDR_{it} + \beta_3 OCI_{it} + \beta_4 OCA_{it} \\
 &+ \beta_5 ROA_{it} + \beta_6 SIZE_{it} + \varepsilon_{it}.
 \end{aligned} \tag{2}$$

The dependent variable, denoted as financial stability, represents the conventional and Islamic banks. The variable  $CTA_{it}$  refers to the cash to asset ratio,  $LDR_{it}$  refers to the liabilities to deposit ratio,  $OCI_{it}$  refers to the operational cost to income, while  $ROA_{it}$  and  $SIZE_{it}$  represents the return on assets and logarithm of total assets as control variables. The conventional and Islamic banks are estimated separately to reflect possible variations in the dynamics of risk and stability.

### 3. RESULTS

The data provided in Table 2 are the descriptive statistics for conventional and Islamic banks. The average financial stability for conventional banks is 3.2451, with values ranging from 1.0158 to 5.7901. It shows normal kurtosis (2.0171) and a tiny positive skew (0.2336). The liabilities-to-deposit shows an average of 1.1623, with a posi-

tive skew of 1.1432 and a high kurtosis of 5.7987. The operational cost-to-income ratio averages 2.057, with a slight skewness of 0.154, whereas the cash-to-asset ratio has a mean of 0.1009 and a tiny negative skew of -0.2683. With an average of 0.0229 and a significant negative skew of -0.9824, the operational cost to total assets is low. Conventional banks' returns on assets average 1.126, with a minor negative skew of -0.4075, while their size averages 9.4456, with a moderate kurtosis of 3.8949 and a positive skew of 1.144.

In contrast, Islamic banks demonstrate significantly greater financial stability, with an average of 86.8929 and substantial variability (standard deviation = 39.0588). The loan-to-deposit ratio is marginally higher, with a mean of 1.2104 and moderate variability, with a positive skew of 0.9029. The cost-to-assets ratio is also higher at 0.219, with a modest negative skew of -0.0942. The operating costs-to-income ratio is marginally lower, with an average of 1.8513, but with a higher degree of asymmetry (skewness = 0.999). The operating costs-to-assets ratio is minimal, with an average of 0.017, and it shows a minor positive skew of 0.4969. It is important to note that the return on assets for Islamic banks is significantly lower, with an average of 0.0098, a negative skew of -0.4978, and a flatter distribution (kurtosis = 1.9449). Islamic banks are also marginally smaller in size, with an average size of 9.315, indicating a negative skew of -0.5312.

**Table 2.** Descriptive statistics of study variables for conventional and Islamic banks

Variables	Mean	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
<b>Conventional banks</b>						
Financial stability	3.2451	5.7901	1.0158	1.2369	0.2336	2.0171
Liabilities to deposit ratio	1.1623	1.5288	1.0308	0.0769	1.1432	5.7987
Cash to Asset Ratio	0.1009	0.2059	0.0002	0.0425	-0.2683	2.8095
Operational cost to income	2.057	4.5762	0.1816	0.9012	0.154	2.9021
operational cost to total assets	0.0229	0.0384	0.0015	0.0099	-0.9824	2.9189
Return on assets	1.126	2.047	-0.161	0.4971	-0.4075	2.2962
SIZE	9.4456	10.4443	8.8503	0.3859	1.144	3.8949
<b>Islamic banks</b>						
Financial stability	86.8929	182.9279	40.7158	39.0588	0.6038	2.7117
Liabilities to deposit ratio	1.2104	1.5691	1.0719	0.1464	0.9029	2.5225
Cash to Asset Ratio	0.219	0.3883	0.0543	0.0875	-0.0942	2.3677
Operational cost to income	1.8513	3.9339	1.0334	0.8264	0.999	2.7852
operational cost to total assets	0.017	0.0236	0.0113	0.0033	0.4969	2.4145
Return on assets	0.0098	0.0149	0.0028	0.0036	-0.4978	1.9449
SIZE	9.315	9.7374	8.6769	0.2931	-0.5312	2.3909

The correlation matrix in Table 3 shows financial stability with other financial variables. Conventional banks indicate that financial stability shows a positive relationship with returns on assets at 0.64, which demonstrates that higher profitability levels enhance financial stability. The operational cost-to-income ratio of  $-0.29$ , along with the cash-to-asset ratio of  $-0.12$  and operational cost-to-total assets ratio of  $-0.13$ , show a negative correlation with FS. The relationship between financial stability  $-0.12$  and bank size indicates that larger institutions face challenges to maintain financial stability.

The financial stability correlations in Islamic banks show how variables affect each other to identify key stability factors. The research shows that financial stability has positive relationships with the three ratios: liabilities-to-deposit ratio, operational cost-to-income ratio, and operational cost-to-total assets ratio. The correlation coefficients are 0.35, 0.41, and 0.56, respectively. Financial stability improvements require effective management of operating expenses and liabilities according to these positive correlation results. Bank stability shows negative relationships with cash-to-asset ratio ( $-0.27$ ), ROA ( $-0.41$ ), and bank size ( $-0.25$ ).

Table 4 highlights the unit root test of both conventional and Islamic banks, showing the stationarity tests for financial variables. Significant test statistics at the 1% level indicate that most variables for conventional banks, such as financial stability,

loan-to-deposit ratio, operational cost-to-income (OCI), operational cost-to-total assets, and return on assets, are stationary at the level. However, it appears that the cash-to-asset ratio and bank size are non-stationary at the level but become stationary after first differencing. Conversely, most variables in Islamic banks are non-stationary at the level of financial stability, cash-to-asset ratio, operational cost-to-income, operational cost-to-total assets, return on assets, and size. Nevertheless, the loan-to-deposit ratio is stationary at this level.

Potential multicollinearity problems in the regression models are revealed by the variance inflation factor (VIF) values for the variables in conventional and Islamic banks (Table 5). The loan-to-deposit ratio stands at 1.0743, the cash-to-asset ratio at 1.0558, the operational cost-to-income ratio at 1.2075, the operational cost-to-total-assets ratio at 1.168, the return on assets at 1.094, and the bank size at 1.1369. All these variables for conventional banks show VIF values below the generally recognized cutoff of 10. These low numbers indicate that conventional banks do not exhibit multicollinearity.

On the other hand, Islamic banks exhibit somewhat larger VIF values, especially for first-differenced variables. Cash-to-asset ratio, operational cost-to-income, operational cost-to-total assets, return on assets, and size have VIF values of 1.8067, 3.1228, 2.5151, 2.0463, and 3.0317, respectively, whereas the liabilities-to-deposit ratio has a

**Table 3.** Correlation matrix

Variables	FS	LDR	CTA	OCI	OCA	ROA	SIZE
<b>Conventional banks</b>							
Financial stability	1	–	–	–	–	–	–
Liabilities to deposit ratio	$-0.14$	1	–	–	–	–	–
Cash to Asset Ratio	$-0.12$	$-0.1$	1	–	–	–	–
Operational cost to income	$-0.29$	0.16	$-0.19$	1	–	–	–
operational cost to total assets	$-0.13$	0.2	0.18	0.54	1	–	–
Return on assets	0.64	$-0.22$	$-0.01$	$-0.49$	$-0.1$	1	–
SIZE	$-0.12$	$-0.18$	0.47	$-0.41$	$-0.45$	$-0.06$	1
<b>Islamic banks</b>							
Financial stability	1	–	–	–	–	–	–
Liabilities to deposit ratio	0.35	1	–	–	–	–	–
Cash to Asset Ratio	$-0.27$	$-0.45$	1	–	–	–	–
Operational cost to income	0.41	0.66	$-0.35$	1	–	–	–
operational cost to total assets	0.56	0.28	$-0.3$	0.74	1	–	–
Return on assets	$-0.41$	$-0.71$	0.35	$-0.78$	$-0.49$	1	–
SIZE	$-0.25$	$-0.56$	0.19	$-0.79$	$-0.72$	0.74	1

**Table 4.** Unit root test results

Variables	At level	First-difference	Integration order
<b>Conventional banks</b>			
Financial stability	(-4.9586)***	–	I(0)
Liabilities to deposit ratio	(-6.854)***	–	I(0)
Cash to Asset Ratio	-1.2137	(-11.1946)***	I(1)
Operational cost to income	(-4.3292)***	–	I(0)
operational cost to total assets	(-7.4316)***	–	I(0)
Return on assets	(-3.8422)***	–	I(0)
SIZE	-1.1749	(-15.985)***	I(1)
<b>Islamic bank</b>			
Financial stability	0.1615	(-3.908)***	I(1)
Liabilities to deposit ratio	(-4.9995)***	–	I(0)
Cash to Asset Ratio	-0.9774	(-2.6195)***	I(1)
Operational cost to income	0.3395	(-4.3966)***	I(1)
operational cost to total assets	-0.5222	(-3.771)***	I(1)
Return on assets	-0.3881	(-3.3815)***	I(1)
SIZE	0.7183	(-3.2176)***	I(1)

Note: \*\*\* P < 0.01 indicates statistical significance at the 1% level.

**Table 5.** Results of the variance inflation factor (VIF)

Conventional banks		Islamic banks	
Variable	VIF	Variable	VIF
Liabilities to deposit ratio	1.0743	Liabilities to deposit ratio	2.0682
Δ (Cash to Asset Ratio)	1.0558	Δ (Cash to Asset Ratio)	1.8067
Operational cost to income	1.2075	Δ (Operational cost to income)	3.1228
operational cost to total assets	1.168	Δ (Operational cost to total assets)	2.5151
Return on assets	1.094	Δ (Return on assets)	2.0463
Δ (SIZE)	1.1369	Δ (SIZE)	3.0317

VIF of 2.0682. Despite being greater than those for conventional banks, these numbers show they do not exhibit multicollinearity as they are still considerably below the crucial threshold.

The variance inflation factor (VIF) provides measurements to evaluate multicollinearity. The symbol Δ ( )' represents the first difference of the variable.

The Breusch-Pagan test results, presented in Table 6, assess the existence of heteroscedasticity in the regression models for conventional and Islamic banks. The F-statistic for conventional banks is 0.0739, accompanied by a p-value of 0.941. Given that the p-value substantially exceeds 0.05, the null hypothesis of homoscedasticity is upheld, suggesting that the model is free from heteroscedasticity.

The F-statistic for Islamic banks is 4.7991, accompanied by a p-value of 0.1871. Likewise, the p-value surpasses the 0.05 significance threshold, indi-

cating that the null hypothesis of homoscedasticity is not rejected. Consequently, the Islamic Banks model is devoid of heteroscedasticity.

In conclusion, the Breusch-Pagan test demonstrates that both models are homoscedastic, guaranteeing that the assumption of constant variance in the error terms is satisfied and therefore improving the reliability of the regression analysis for both banking systems.

**Table 6.** Breusch-Pagan test results

Model	F-statistic	Prob.
Conventional banks	0.0739	0.941
Islamic banks	4.7991	0.1871

Table 7 presents the findings of diagnostic tests conducted on the models for conventional and Islamic banks, offering information on the models' statistical characteristics and applicability. Given the null hypothesis that there are no systematic differences between random and fixed effects cannot be rejected,

the Hausman test for conventional banks produces a test value of 4.2263 and a p-value of 0.6461, indicating that the random effects model is acceptable. The choice of panel data models rather than a pooled regression is justified by the existence of strong random effects, as indicated by the Lagrange multiplier (LM) test, which yields a test value of 198.9998 with a very significant p-value (0.000). The robustness of the panel data model is further supported by the cross-section F-test, which displays a test result of 19.4845 with a p-value of 0.000.

The Hausman test yields a test value of 2.1861 and a p-value of 0.9018 for Islamic banks, indicating that the random effects model is also suitable for this dataset. Random effects are not statistically significant, according to the Lagrange multiplier (LM) test, which yields a test value of 2.7959 with a p-value of 0.1367. A pooled regression model would provide a better fit. The cross-sectional F-test shows that the cross-sectional effects in the Islamic Banks model are not significant. The p-value is 0.19012, and the test value is 1.7985. In conclusion, the findings indicate that a random effects panel model has good support for conventional banks but that a pooled regression model may be better suited for Islamic banks. These distinctions draw attention to the two banking systems' fundamental peculiarities and the necessity of customized econometric modeling techniques.

**Table 7.** Comparison between study models

Conventional banks		
Type test	Test value	Prob
Hausman	4.2263	0.6461
Lagrange Multiplier	198.9998	0.000
Cross-section F	19.4845	0.000
Islamic banks		
Type test	Test value	Prob
Hausman	2.1861	0.9018
Lagrange Multiplier	2.7959	0.1367
Cross-section F	1.7985	0.19012

**Table 8.** Random effects model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Liabilities to deposit ratio	-3.1805	0.9643	-3.2982	0.0071
$\Delta$ (Cash to Asset Ratio)	1.1385	1.1361	1.0020	0.3379
Operational cost to income	-0.7677	0.1017	-7.5461	0.0000
Operational cost to total assets	-5.2944	28.1227	-0.1883	0.8541
Return on assets	0.4066	0.1815	2.2407	0.0466
$\Delta$ (SIZE)	-1.5274	0.4739	-3.2233	0.0081
C	23.0706	4.6168	4.9971	0.0004

$R^2 = 47\%$  Prop(F) = 0.0000

Note:  $P < 0.01$ ,  $P < 0.05$ , and  $P < 0.1$  indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

The random effects model in Table 8 highlights important variables affecting financial stability. The loan-to-deposit ratio significantly ( $\beta = -3.1805$ , p-value = 0.0071) impairs financial stability, indicating that greater loan-to-deposit ratio levels erode stability. Similarly, the importance of cost efficiency is shown by the operational cost-to-income ratio ( $\beta = -0.7677$ , p-value = 0.0000), which shows a strong negative link with financial stability. However, return on assets has a positive influence ( $\beta = 0.4066$ , p-value = 0.0466) on financial stability, highlighting the importance of profitability. Bank size also has a negative impact ( $\beta = -1.5274$ , p-value = 0.0081) on financial stability, which may reflect the difficulties large banks confront. Despite being part of the model, the cash-to-asset ratio and operational cost-to-total assets have p-values of 0.3379 and 0.8541, respectively, which show they have no discernible impact on financial stability. The model's R-squared value of 47% indicates that the variables account for almost half of the variation in financial stability, and the model is statistically significant ( $p = 0.0000$ ). These findings highlight the need for good cost management, operating efficiency, and profitability to improve financial stability, as well as addressing the possible risks associated with higher liabilities-to-deposit ratios and bigger bank sizes.

Table 9 demonstrates the connections between important explanatory factors and financial stability, displaying the findings of the pooled regression model for Islamic banks. The loan-to-deposit ratio has a positive and statistically significant influence ( $\beta = 0.1477$ ,  $p = 0.0000$ ) on financial stability, indicating that a higher loan-to-deposit ratio improves financial stability. Moreover, the cash-to-asset ratio has a positive and significant impact ( $\beta = 0.2056$ ,  $p = 0.0251$ ). Return on assets likewise shows a substantial positive correlation

**Table 9.** Pooled (OLS) regression model for Islamic banks

Variable	Coefficient	Std. error	t-statistic	Prob.
Liabilities to deposit ratio	0.1477	0.0279	5.2832	0.0000
$\Delta$ (Cash to Asset Ratio)	0.2056	0.0858	2.3965	0.0251
$\Delta$ (Operational cost to income)	-0.0168	0.0135	-1.2423	0.2266
$\Delta$ (Operational cost to total assets)	5.5476	3.9194	1.4154	0.1703
$\Delta$ (Return on assets)	12.2083	5.1281	2.3807	0.0260
$\Delta$ (SIZE)	-2.2712	0.2311	-9.8285	0.0000
C	-0.2463	0.0237	-10.3967	0.0000
R <sup>2</sup> = 86% Prop(F) = 0.0000				

Note: P < 0.01, P < 0.05, and P < 0.1 indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

( $\beta = 12.2083$ ,  $p = 0.0260$ ), highlighting the role that profitability plays in bolstering financial stability.

In contrast, the statistically significant bank size ( $\beta = -2.2712$ ,  $p = 0.0000$ ) indicates that larger Islamic institutions may encounter difficulties in maintaining stability. In contrast, the operational cost-to-income ratio and operational cost-to-total assets are not statistically significant, with p-values of 0.2266 and 0.1703, respectively. This implies that these variables do not have a significant impact on financial stability in this context. The R-squared ( $R^2$ ) value indicates that the model explains 86% of the variation in financial stability, and the F-statistic (0.0000) p-value indicates that the model is highly significant. These findings underscore the critical role of profitability, liquidity, and efficient management of bank size in enhancing financial stability for Islamic banks, while also emphasizing the diminished relevance of operational cost variables in this context.

## 4. DISCUSSION

The first main research hypothesis demonstrates that operational and liquidity risks do not have a statistically significant influence ( $\alpha \leq 0.05$ ) on financial stability for Jordanian conventional banks. The four sub-hypotheses test whether these variables – liabilities-to-deposits ratio, cash-to-assets ratio, operational cost-to-income ratio, and operational cost-to-total assets ratio – have no statistically significant influence at the  $\alpha \leq 0.05$  significance level. The analysis shows that both the liabilities-to-deposits ratio and the operational cost-to-income ratio negatively affect financial stability, thus rejecting the first and third sub-hypotheses.

The second and fourth sub-hypotheses do not show that they have a statistically significant effect on financial stability.

Moreover, the second main hypothesis demonstrates that operational and liquidity risks do not have a statistically significant influence at  $\alpha \leq 0.05$  on financial stability for Jordanian Islamic banks. The analysis tests four sub-hypotheses to determine if the variables – liabilities-to-deposits ratio, cash-to-assets ratio, operational cost-to-income ratio, operational cost-to-total assets ratio – have no statistically significant influences at the  $\alpha \leq 0.05$  significance level. The analysis shows that both the liabilities-to-deposits ratio and the cash-to-assets ratio significantly affect financial stability, as the first and second sub-hypotheses were rejected. The results show that the operational cost-to-income ratio and the operational cost-to-total assets ratio do not affect financial stability at a statistically significant level.

In addition, control variables such as return on assets (ROA) have a positive impact on the stability of conventional and Islamic banks. However, the size of conventional and Islamic banks has a negative effect on their stability, since it indicates that larger banks would be vulnerable to operational risks and financial vulnerabilities.

The results of the study found that operating risks and liquidity risks have an impact on the financial stability of commercial and Islamic banks in Jordan, with differences, which is consistent with previous studies (Fadun & Oye, 2020; Mergu & Rao, 2020). The results of the study on the negative impact of both liquidity and operational risks on commercial banks are in line with previous studies (Amara & Mabrouki, 2019; Leykun, 2016;

Fadun & Oye, 2020). Regarding liquidity risks in Islamic banks, there was a positive impact, which is consistent with the results of previous studies (Yaacob et al., 2016; Al-Husainy & Jadah, 2021). Moreover, it was found that there is no impact of operational risks on the financial stability of Islamic banks, which is consistent with the results of previous studies (Kaharuddin & Yusuf, 2022;

Astanggi & Baskara, 2025). In general, comparative analysis indicates that Islamic banks have a relatively greater ability to confront liquidity risks, and this may be reinforced by the fact that banks operating in accordance with Islamic law may enhance financial stability. This study contributes to providing new evidence in the context of emerging markets such as Jordan

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## CONCLUSION

The study aims to identify liquidity and operational risks and their impact on financial stability in Islamic and traditional banking institutions in Jordan. Financial stability for conventional banks heavily relies on four key factors, which include the loan-to-deposit ratio, the operating cost-to-income ratio, return on assets, and bank size. The study demonstrates how maintaining proper liquidity, while managing costs effectively, becomes essential because of negative impacts from the loan-to-deposit ratio and operational cost-to-income ratio performance. The financial stability of a business improves when its return on assets is high, which confirms that profitability serves as a stabilizing force. Study findings show that larger banks are less stable.

The analysis demonstrates that financial stability improvement for Islamic banks becomes possible through effective management of the loan-to-deposit ratio, return on assets, and cash-to-asset ratio. A bank's liquidity stability is positively affected by maintaining proper loan-to-deposit and cash-to-asset ratios. Profitability plays a vital role in stability enhancement according to return on assets measurements. Bigger Islamic banks could encounter financial instability problems because of structural issues alongside risk factors, even though the relationship between bank size and stability is negative. The study indicates that operational cost variables measured through the operational cost-to-income ratio and operational cost-to-total assets cannot establish statistical significance in the case of Islamic banking institutions.

The research outcomes demonstrate the need for specialized policies that will strengthen financial stability across banking systems. Conventional banks need to achieve three essential goals, which include enhancing liquidity, maximizing profitability, and improving cost efficiency. Islamic banks had to focus on profitability and liquidity management as they dealt with risks stemming from their growing bank capacity during this period. The research results establish guidelines that financial institutions and regulators can use to enhance banking industry stability.

## DATA AVAILABILITY STATEMENT

The corresponding author can provide the supporting data of this study on a reasonable request.

## COMPETING INTERESTS

The authors indicate that they do not have competing interests.

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## APPENDIX A

**Table A1.** Conventional and Islamic Jordanian banks listed on the Amman Stock Exchange

No.	Bank name	Type	Study period	Website
1	Jordan Kuwait Bank	Conventional	2012–2022	<a href="https://www.jkb.com">https://www.jkb.com</a>
2	Jordan Commercial Bank	Conventional	2012–2022	<a href="https://www.jcbank.com.jo">https://www.jcbank.com.jo</a>
3	Housing Bank	Conventional	2012–2022	<a href="https://www.hbtf.com">https://www.hbtf.com</a>
4	Arab Jordan Investment Bank	Conventional	2012–2022	<a href="https://www.ajib.com">https://www.ajib.com</a>
5	Bank al Etihad	Conventional	2012–2022	<a href="https://www.bankaletihad.com">https://www.bankaletihad.com</a>
6	Arab Banking Corporation	Conventional	2012–2022	<a href="https://www.bank-abc.com">https://www.bank-abc.com</a>
7	Invest Bank	Conventional	2012–2022	<a href="https://www.ibank.jo">https://www.ibank.jo</a>
8	Capital Bank of Jordan	Conventional	2012–2022	<a href="https://www.capitalbank.jo">https://www.capitalbank.jo</a>
9	Cairo Amman Bank	Conventional	2012–2022	<a href="https://www.cab.jo">https://www.cab.jo</a>
10	Bank of Jordan	Conventional	2012–2022	<a href="https://bankofjordan.com">https://bankofjordan.com</a>
11	Ahli Bank	Conventional	2012–2022	<a href="https://ahli.com">https://ahli.com</a>
12	Arab Bank	Conventional	2012–2022	<a href="https://arabbank.jo">https://arabbank.jo</a>
13	Jordan Islamic Bank	Islamic	2012–2022	<a href="https://www.jordanislamicbank.com">https://www.jordanislamicbank.com</a>
14	Safwa Islamic Bank	Islamic	2012–2022	<a href="https://www.safwabank.com">https://www.safwabank.com</a>
15	Islamic International Arab Bank	Islamic	2012–2022	<a href="https://iiabank.com.jo">https://iiabank.com.jo</a>