Bank Risks, and Bank Stability: The Moderating Role of State Ownership in the MENA Region

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Abstract: This paper empirically examines the impact of state ownership on the relationship between bank risks and financial stability for a sample of 110 banks within the period 2007-2021 with 1650 bank observations listed in the Middle East and North Africa regions. The findings show that there is no simultaneous link between credit risk and liquidity risk. Liquidity and credit risks can be managed jointly to affect banking stability. State banks are more stable, less likely to engage in risky behavior, and more concerned with social welfare. State banks eliminate the impact of banks' risks on banking stability. Results enhance good governance, economic development, and employment opportunities, maintain financial safety, and ultimately enhance growth. Our results are consistent with the present regulatory framework, particularly Basel III, which confirms the importance of joint management of liquidity and credit risk.

1 INTRODUCTION

The banking sector constitutes a fundamental component of the financial system, serving as the foundational financial infrastructure for the economy of any country, and therefore it is necessary to contribute to conducting research on financial stability analysis even in light of a stable macroeconomic environment. The most significant financial risks that directly affect what banks do and why they fail are credit and liquidity risks (Abdelaziz et al., 2022). Liquidity risk is an opportunity for depositors to withdraw their deposits suddenly (Ghenimi et al., 2021; Thakor & Yu, 2024). Credit risk means the inability of borrowers to repay on time and constantly changing interest rates (Naili & Lahrichi, 2022).

This study differs from other previous studies on the MENA region in four aspects. First, this paper investigates the effect of bank risks on bank stability in the MENA region via different statistical methods like OLS to check the static model, 2SLS to address the possible endogeneity problem, and GMM to explore the dynamic results. Second, this study is the first to provide evidence that state ownership moderates the relationship between bank risks and bank stability in large conventional banks in the MENA region over the long period of 2007–2021. Third, we use Merton's distance to default (DD) and Z-score as financial stability measures, which Z-score uses in most literature based on accounting measures, while Merton's distance to default (DD) is one of the most important measures taken into consideration by investors' expectations regarding equity. Fourth, we use a large sample of the MENA region, where these countries are characterized by common economic, political, and social features in addition to the same accounting standards.

Our paper is organized as follows. Section 2 presents the relevant literature review, while Section 3 describes the data and methods. The findings and robust checks are outlined in Section 4, and the summary and conclusion are outlined in Section 5.

2 LITERATURE REVIEW

2.1 Credit Risk and Liquidity Risk

According to the traditional theory of financial intermediation, scholars assert that credit risk and liquidity risk are positively correlated. For instance, Cai and Zhang (2017) found a positive association between credit risk and liquidity risk in Ukrainian

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banks. Some studies emphasize how there is a negative correlation between credit risks and liquidity risks (Louati et al., 2015; Hassan et al., 2019; Le & Pham, 2021). In contrast, some studies show there is no economically significant reciprocal relationship between the two risks (Imbierowicz & Rauch, 2014; Ghenimi et al., 2017). Most research on the reciprocal relationship is linear, with two studies examining a nonlinear relationship (Pop et al., 2018; Boussaada et al., 2022). According to the various points of view and empirical studies mentioned above, we propose the following hypothesis:

H_1: There is an interdependency between credit risks and liquidity risks.

2.2 Credit, Liquidity Risks and Stability

Bank stability is necessary to ensure the smooth functioning of financial activities in emerging economies. Banks are subject to several risks, like liquidity risk and credit risk. Imbierowicz and Rauch (2014) show that both credit and liquidity risks jointly influence the possibility of bank failure. Ghenimi et al. (2017) found that the existence of an individual and joint influence for both liquidity and credit risks on banking stability. Hassan et al. (2019) concluded that both liquidity risks and credit risks adversely affect financial stability. Lachaab (2023) concluded that credit and liquidity hurt bank stability in Islamic banks. Some of the literature argues that credit risk is the most important part of determining bank stability, while generally liquidity risk is ignored (Lachaab, 2023; Ben Lahouel et al., 2024).

On the other hand, some of the literature concludes that the interaction between liquidity and credit risk leads to higher bank failure risk through a decrease in market liquidity due to an increase in risk premium (He & Xiong, 2012). Some studies indicated that non-traditional banking activities increase risks, whereas adequate funding liquidity positively affects stability, reinforcing the need for effective risk management (Habib et al., 2022).

Chai et al. (2022) found that bank-specific risks, including credit and liquidity, negatively impact bank stability in Pakistan. According to theoretical and empirical research, liquidity and credit risks can affect bank stability, and interacting between both credit and liquidity risks may reduce the likelihood of bank failure and thus improve banking stability. Based on the aforementioned discussion, we propose that:

H_2: Liquidity risk and credit risk jointly support banking stability.

2.3 State Ownership and Stability

Theoretical perspectives support government ownership as a tool to secure capital to fund projects with high social and political returns but might have high risk and low financial returns (Boulanouar et al., 2021).State ownership is viewed from two perspectives. According to the first perspective, ownership structures foster good governance, economic development, financial safety, and growth by attracting employment opportunities through various financing methods, even without private financing (Lassoued et al., 2016; Boulanouar et al., 2021). State-owned banks are less likely to engage in risky behavior and are more concerned with social welfare. The second perspective is associated with the conflict between the agent (managers) and principal (owners), hence raising agency problems in state ownership compared to private bank. Managers may achieve their own goals regardless of the interests of the ultimate owners due to bureaucracy and the inefficiency of capital market. State ownership enjoys governmental protection, which may push more risky decisions because losses and excess costs are constantly being paid by the government. The lending practices of state banks may prioritize social goals over financial ones through their unprofitable projects to achieve their social objectives. Politicians essentially control state-owned banks by achieving their own goals instead of their social ones and by having the ability to transfer resources to their backers. Soft budget constraints in state banks are related to excessive risk-taking behavior and resource allocation. Empirical results support two perspectives related to state ownership and bank stability. The first perspective argued that state ownership is associated with increased efficiency and lower risk-taking (Boubakri et al., 2020).On the other hand, the second preservative supports the role of state ownership in raising risk-taking and insolvency risk and decreasing financial stability. State ownership plays a positive role in the face of cyclical fluctuations, preventing private banks from generating credit bubbles. Restricting loan granting during boom periods is crucial for banking stability. Boulanouar et al. (2021) found that state-owned banks are more stable than privately owned banks within 14 years for 76 GCC markets. Mateev et al. (2023) argued that ownership structure has a significant impact on shaping risk behavior in the MENA region. Hunjra et al. (2020) found that state banks have more risk-taking behavior compared to foreign banks in emerging markets. Based on the theoretical and empirical arguments, we formulate the third hypothesis as follows:

H_3: State ownership is positively related to bank stability in the MENA region.

2.4 Moderating Role of State Ownership

Some of the literature argues that government ownership increases risk-taking (Shleifer & Vishny, 1997; Laeven & Levine, 2009; Haque & Shahid, 2016), while other studies suggest decreased risk-taking (Iannotta et al., 2007; Haddad et al., 2020; Alshammari, 2022).

Shleifer and Vishny (1997) believe that government ownership leads to inefficiency because of conflicts between political and social goals, bureaucracy and corruption, and politics among interest groups. Haddad et al. (2020) concluded that ownership structure had a significant positive impact on conventional banks' performance but not on Islamic banks.

The authors argue that state ownership moderates the relationship between bank risks and bank stability from two perspectives: Firstly, state ownership creates governmental protection caused by increased risk-taking behavior and thus decreases bank stability. In countries with inadequate legal and regulatory frameworks, agency disputes related to state control are more prevalent and thus increase risk-taking. Secondly, state ownership is related to good governance and economic development, which maintains financial safety and ultimately enhances bank stability. The government seeks to achieve its different social and political goals through its participation in banks. State-owned banks are less likely to engage in risky behavior and are more concerned with social welfare compared to non-state banks. Based on the above explanation, the authors suggest that state ownership may moderate the relationship between bank risks and stability in the MENA region, and thus we formulate both the fourth and fifth hypotheses as follows:

H_4: State ownership inversely impacts the relationship between credit risk and bank stability in the MENA region.

H_5: State ownership inversely impacts the relationship between liquidity risk and bank stability in the MENA region.

Consequently, this paper addresses the subsequent research questions. First, Is there a causal relationship between liquidity risk and credit risk? Second, how do the joint of credit risks and liquidity risks affect the banking stability? Finally, does state ownership moderate the relationship between bank risks and banking stability?

The proposed model is illustrated in Figure (1).

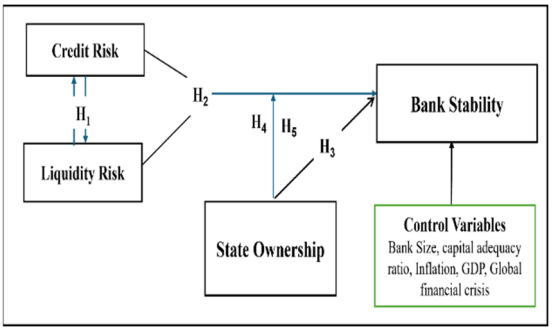

Figure 1: The proposed research model.

3 RESEARCH DESIGN

3.1 Sample and Data

Our sample consists of 110 commercial banks from 16 MENA countries from 2007 to 2021, excluding unstable countries and Islamic banks. The final sample included 1650 bank-year observations. The sample excluded Islamic banks due to potential differences in bank risks. The study examines the long-term impact of bank risks on bank stability from 2007 to 2021, encompassing economic uncertainty events like the global financial crisis in 2008, Arab Spring in 2010, and US presidential election in 2020, and the prolonged uncertainty around Brexit, and other events, the research period encompassed the majority of economic uncertainty occurrences. Data is gathered from Bankscope while macroeconomic variables are obtained from the World Bank. Table (1) reveals that state ownership accounted for 66% of banks, while non-state ownership was 34%.

Table 1: Sample distribution.

Ownership structure	Freq	%
State banks	1089	66
Non-State banks	561	34
Total	1650	100

3.2 Empirical Models

This study explores the causal link between credit and liquidity risk in the MENA region using two-stage least squares (2SLS) and panel vector autoregressive (PVAR). Also, we explore the impact of state ownership on the relationship between bank risks and bank stability. According to the simultaneous equation (2SLS), the formula is as follows:

$$CR_{k,t} = \alpha_0 + \beta_1 CR_{k,t-1} + \beta_2 LR_{k,t} + \sum_{f=1}^{F} \beta_f Bank^f{}_{k,t} + \sum_{m=1}^{M} \beta_m Macro^m{}_{k,t} + \eta_{k,t} \quad (1)$$

$$LR_{k,t} = \alpha_0 + \beta_1 LR_{k,t-1} + \beta_2 CR_{k,t} + \sum_{g=1}^{g} \beta_f Bank^g{}_{k,t} + \sum_{n=1}^{N} \beta_m Macro^n{}_{k,t} + \eta_{k,t} \quad (2)$$

$CR_{k,t}$ refers to credit risk. $LR_{k,t}$ expresses liquidity risk. Bank $_{k,\,t,}$ and Bank $^{g}{}_{k,t}$ refer to bank-specific variables: BS, CAR, and GFC. Macro $^{m}{}_{k,\,t,}$ and Macro $^{n}{}_{k,\,t}$ refer to the INF and GDP.

Panel vector autoregressive (PVAR) explores the causal relationship between credit and liquidity risk. By introducing fixed effects ($\pi_{k,\,t}$), PVAR accounts for individual bank specificity at the level of the variables as follows:

$$Y_{k,t} = \pi_{k,t} + \mu(L) Y_{k,t} + \eta_{k,t} \quad (3)$$

Where $Y_{k,t}$ is a vector of variables and μ (L) denotes the lag operator.

The research model to explore the impact of ownership structure on the relationship between risk and bank stability Whereby the formula is as follows:

$$ZSC_{it} = \alpha + \beta_1 CR_{it} + \beta_2 LR_{it} + \beta_3 CR_{it} * LR_{it} + \beta_4 OWN_{it} + \beta_5 OWN_{it} * CR_{it} + \beta_6 OWN_{it} * LR_{it} + \beta_7 BS_{it} + \beta_8 CAR_{it} + \beta_9 INF_{it} + \beta_{10} GDP_{it} + \beta_{11} GFC_{it} + \epsilon_{it} \quad (4)$$

We measured bank stability through the Z-score (Ghenimi et al., 2017; Naili & Lahrichi, 2022), which considers profitability, leverage, and return volatility. It measures return on assets (ROA) and return on equity (ROE). A higher Z-score indicates increased stability and a decrease in bankruptcy probability. The log of the Z-score is used due to its asymmetry and high skewness (Ahamed & Mallick, 2017). In the robustness check, we employ DD as an alternate metric of stability. We measure credit risk based on non-performing loans divided by total loans (Natsir et al., 2019; Naili & Lahrichi, 2022). The higher value of credit risk means higher loan losses, and the bank should change its credit policy to be able to manage its loans. Liquidity risk is measured by the sum of liquid assets to total assets (Ghenimi et al., 2017; Hassan et al., 2019). Liquid assets are the sum of demand deposits, transaction deposits, and contingent liabilities within a fiscal year. A positive score indicates insufficient liquid assets for short-term obligations, necessitating funding from other sources, while a negative score indicates more liquid assets than short-term liabilities.We measure ownership structure with a dummy variable equal to 1 if the bank is a state and 0 otherwise (Boulanouar et al., 2021). We account for several bank-specific variables that are frequently associated with bank stability, such as bank size, which is determined by the natural logarithm of total assets. We also take into consideration other bank-specific variables, such as the capital adequacy ratio (CAR), which measures the equity-to-asset ratio. Financial crisis period measured by the dummy variable 1 if the year is 2007, 2008, 2009, and 0 otherwise. It is necessary to use both country and year-fixed effects as control variables. This study also considers the yearly growth rate of the gross domestic product (GDP), as well as inflation, which is measured by the inflation rate (Hassan et al., 2019).

4 RESULTS

4.1 Descriptive Statistics

Table 2 presents the mean of both credit and liquidity risks is about 0.635 and 0.294, respectively, which implies high credit and liquidity risks, while the average BS and CAR are about 6.842 and 17.599, respectively, which denotes a high bank size and capital adequacy ratio. Indeed, the averages of both INF and GDP are about 3.548 and 3.442, respectively, which indicates high inflation and gross domestic product. According to financial stability, the averages of Z_{ROA}, Z_{ROE}, and DD are about 3.855, 3.323, and 3.703, respectively, which denotes high financial stability in the MENA region.

Table 2: Descriptive Statistics.

Var	N	Mean	SDV	Min	Max
Z_{ROA}	1650	3.855	0.267	3.483	4.162
Z_{ROE}	1650	3.323	0.452	2.637	4.286
DD	1650	3.703	0.348	3.105	4.265
CR	1650	.635	0.414	0.2	1.4
LR	1650	.294	.023	.256	.329
BS	1650	6.842	0.735	5.7	8
CAR	1650	17.599	4.712	9.16	24.67
INF	1650	3.548	2.699	0.693	9.42
GDP	1650	3.442	1.482	1.1	6.4

4.2 Causality Test

Table 3 shows the causality between credit risk and liquidity risk using 2SLS. The null hypothesis of the Durbin-Wu-Hausman test is rejected, and the Hansen test confirms the over-identifying restriction null hypothesis. We find no meaningful reciprocal relationship between credit and liquidity concerns, consistent with the literature (Imbierowicz & Rauch, 2014; Ghenimi et al., 2017). This result shows that there is a unidirectional causal relationship between credit and liquidity risks.

Table 3: Credit and liquidity risks using 2SLS.

Var	CR	LR
CR		-0.484***
LR	-.393	
BS	.006***	.0062**
CAR	.061***	0.030
INF	.001***	.001***
GDP	0.001	-.0022**
GFC	-.005*	0.000
_cons	1.753***	1.075
AR (1)	0.000	0.000
AR (2)	0.232	0.193
Hansen J –test	0.343	0.435
DWH test	0.000	0.000
Note: ***p < 0.01; **p < 0.05; *p < 0.1.		

Robustness check using panel vector autoregression (PVAR) and Granger causality in both tables 4 and 5 show that there is no economically significant patterns of causal links between credit and liquidity risks.

Table 4: panel vector autoregression (PVAR).

VAR		Coef.	St. Err.	Ŷ	P>z
CR	CR t-1	0.607	0.146	4.14	0.000
	LR t-1	2.743	1.993	1.38	0.169
LR	CR t-1	0.033	.016	2.02	0.044
	LR t-1	.382	.208	1.84	0.066

Results show that credit and liquidity concerns have a unidirectional causal link using a lot of different methods like 2SLS, PVAR, and Granger causality. Therefore, we rejected the first hypothesis H_1.

Table 5: Granger causality test.

Granger	Equation	Excluded	chi2	Df	Prob
Wald tests	CR	LR	1.895	1	0.169
	LR	CR	4.067	1	0.044

4.3 OLS &GMM Test

Table 6 presents the results from pooled OLS and dynamic GMM. The GMM specification test AR (2) is valid for testing bank serial correlation, indicating the empirical model's accuracy. Hansen J-statistic tests show higher than 0.1, valid over-identifying limits, and accurate model formulation. Positive and significant Z_{ROAt-1} and Z_{ROEt-1} indicate GMM's dynamic fit. The study reveals that credit risk increases, and bank stability declines due to higher loan rates. Liquidity risk significantly affects banking stability, as stable banks are more liquid. Ineffective handling of liquidity risk by banks and regulators can lead to a liquidity crisis, threatening stability and highlighting the importance of maintaining stability. The study reveals a negative and significant interaction between credit and liquidity risk on banking stability at a level of 5%, with high credit risk leading to increased liquidity risk and vice versa.

Banks with higher credit risk face reduced liquidity risk and higher charges for stability, despite maintaining stability with sufficient funding. Our findings suggest that a combined rise in liquidity and credit risk reduces stability. Our findings are consistent with the literature supporting the combined rise of bank risks on stability. The negative coefficient of liquidity and credit risk reduces bank stability during crises, leading to higher loan rates and credit risks, resulting in bank defaults, and affecting banks differently. This result is consistent with (Ghenimi et al., 2017; Merton & Thakor, 2022).

These findings suggest that both liquidity and credit issues play an important role in influencing banking stability in the MENA region. These findings support our hypothesis H_2. State banks have a statistically significant impact on the two financial stability models. State banks have the most substantial positive influence on bank stability with 1% and 5% significance levels in OLS and GMM, respectively. This demonstrates how state ownership contributes to financial stability in the MENA region. Therefore, we accepted hypothesis H_3. This result highlights good governance, economic development, and employment opportunities, maintains financial safety, and ultimately enhances growth. Our findings are consistent with the literature supporting the impact of ownership structure on banking stability (Lassoued et al., 2016; Boulanouar et al., 2021). State ownership is less likely to be risky behavior, and more concerned with social welfare compared to private-owned banks, which are more likely to be related to profit maximization and more probably risky behavior. Bank size significantly enhances

banking stability in OLS and GMM models at 1% level, as it diversifies portfolios and improves risk management. Capital adequacy ratio (CAR) also enhances financial stability, acting as a safety net during crises. Financial crises, GDP growth, and inflation rate all impact banking stability in the MENA region, with the latter having a positive effect.

Table 6: The effect of bank risks on stability.

Var	Z_{ROA}		Z_{ROE}	
	OLS	GMM	OLS	GMM
$Z_{ROA\ t-1}$		.557***		
$Z_{ROE\ t-1}$				.384***
CR	-.043*	-.0896**	-.115**	-.118**
LR	-.629*	-2.140**	-1.872**	-2.98**
CR*LR	-.144*	-.290***	-.2159*	-.212**
OWN	.079**	.537***	.0459*	.437*
BS	.055***	.206***	.098***	.108***
CAR	.005***	.021***	.0364***	.025***
INF	.011*	.029*	-.007	-.006
GDP	-.007	-.011*	-.011	-.024*
GFC	-.141*	-.003*	-.062	-.019
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Constant	3.175***	2.654	2.602***	1.961
Obs	1650	1650	1650	1650
F	16.00***		42.10***	
Adjust R^2	.25		.48	
Breusch T Prob	3.44 0.063		1.12 0.290	
Ramsey F Prob	0.46 0.709		3.22 0.103	
Durbin T	1.904		1.960	
Levin-Lin	0.000		0.000	
AR (1) (*p*)		0.000		0.00
AR (2) (*p*)		0.096		0.109
Sargan (*p*)		0.466		0.332
Hansen (*p*)		0.757		0.557
Note: ***p < 0.01; **p < 0.05; *p < 0.1.				

4.4 Main Effects Test

Table 7 shows that state ownership plays an important role in mitigating the association between credit risk and financial stability, in addition to the association between liquidity risk and financial stability in the MENA region. Therefore, we accepted both hypotheses H_4 and H_5.

Table 7: Moderating role via OLS.

Var	Z_{ROA}		Z_{ROE}	
CR	-.045*		-.106***	
LR		-.946**		-.967*
OWN	.110***	.232**	.099***	.506***
CR*OWN	-.153*		-.355**	
LR*OWN		-.523*		-1.500***
BS	.053***	.051***	.106***	.091***
CAR	.005**	.006***	.038***	.037***
INF	.011*	.010*	-.006	-.006
GDP	-.007	-.008	.009	.009
GFC	.140***	.099**	-.064	-.115**
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
_cons	3.360***	3.031***	1.924**	2.209***
N	1650	1650	1650	1650
R^2	.266	.265	.487	.489
Adjust R^2	.250	.249	.476	.478
F-Test	16.28***	16.19***	42.67***	42.98***
Breusch Prob	1.89 (0.169)	1.94 (0.113)	0.45 (0.504)	3.06 (0.08)
Ramsey F Prob	0.11 (0.954)	0.32 (0.807)	2.09 (0.112)	1.85 (0.09)
Durbin T	1.907	1.905	1.959	1.956
Note: ***p < 0.01; **p < 0.05; *p < 0.1.				

4.5 Robustness Test

We follow two-stage robustness checks. Firstly, we used the distance-to-default (DD) as an alternative measure of financial stability to explore the impact of state ownership on the relationship between bank risks and bank stability. The default is measured by subtracting the face value of the bank's debt from its predicted market value and dividing the spread by the bank's expected volatility. We used three models to check the impact of state banks on the association between bank risks and stability using OLS, 2SLS, and GMM methods. Table 8 confirms the findings that state banks positively impact financial stability in the MENA region, while state ownership negatively affects the association between bank risks and stability, highlighting its crucial role in enhancing stability.

Table 8: Robustness check.

Var	OLS		GMM	
CR_{it}	-.185***		-.014**	
OWN_{it}	.100***	.057**	5.34***	2.029**
CR_{it} *OWN	-.231***		-.018*	
LR_{it}		-3.94**		-.717*
LR_{it} *OWN		-.270***		-1.52***
$Control_{it}$	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
_cons	3.709***	4.906***	3.331**	4.672***
N	1650	1650	1650	1650
R^2	.68	0.71		
F-Test	96.41***	110.87***		
Wald chi2			1842.7***	1737.5***
Breusch Chi2 Prob	0.38 (0.53)	0.56 (0.21)		
Ramsey Prob	1.35 (0.08)	1.69 (0.07)		
Durbin T	2.258	2.255		
AR(1) (*p*)			.000	0.009
AR (2) (*p*)			0.117	0.324
Sargan (*p*)			0.791	0.643
Hansen (*p*)			0.211	0.124
Note: ***p < 0.01; **p < 0.05; *p < 0.1.				

5 CONCLUSIONS

This paper investigates the impact of credit and liquidity risk on banking stability using a panel dataset of 110 banks listed in the MENA region from 2007 to 2021. Moreover, our analysis indicated that credit risk and liquidity risk do not exhibit economically significant reciprocal contemporaneous, even though each risk category has a major impact on financial stability. Additionally, we found that the interaction between the two risk categories profoundly affects financial stability. Consequently, the findings of the estimation revealed the pivotal role of credit and liquidity risks in shaping banking stability in the MENA region. We found that state-owned banks are more stable. State ownership is less likely to risky behavior, is more concerned with social welfare, and has increased efficiency compared to non-state ownership, which is associated with more likely risky behavior.

State ownership plays an important role in the association between bank risks (credit and liquidity risks) and financial stability. Our results have several policy implications that are worth considering. First, these findings offer some recommendations for bank management and supervisors in the MENA region.

The financial crisis demonstrated that bank failures caused by credit risk in their portfolios might result in a liquidity market freeze. These findings provide regulators, policymakers, and bank management bodies with a better understanding of bank stability and efficiency, as well as their behavior toward credit and liquidity risk. Our findings suggest that joint liquidity and credit risk management could significantly affect banking stability. Finally, our findings back up current regulatory initiatives, particularly Basel III, which highlight the critical importance of joint management of liquidity risk and credit risk.

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