What Funding Threshold Hampers Bank Performance in MENA? Evidence from Pre and During the COVID-19 Era

Mohamed Amroony*, M.H. Yahya, F Kamarudin, NH Ab Razak and S H Law

School of Business and Economics, Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia.

Abstract: In light of the ongoing Covid-19 pandemic, this paper explores the effects of funding liquidity and the COVID-19 pandemic on bank profitability using a panel data set of 117 unlisted banks headquarters in 13 MENA countries from 2015 to 2020. The estimation results from a dynamic GMM and a dynamic Panel Threshold Regression indicate that during a pandemic, funding liquidity will negatively affect bank profitability; additionally, the relationship between funding liquidity and bank profitability is nonlinear and characterized by the presence of optimal funding liquidity thresholds equal to 46.7%. More precisely, we discovered that increasing funding liquidity above the threshold greatly enhances bank profitability and vice versa below the optimal threshold. In order to preserve their stability, MENA Banks are urged to constantly monitor the optimal NSFR ratio at (47%). The study is expected to assume significance for policymakers as it provides empirical evidence of how funding liquidity has reinforced bank profitability during the COVID pandemic.

Keywords: NSFR; bank profitability; covid-19; dynamic panel threshold; non-linearity.
JEL: G01; G20; G21; G28; G32; G33.

1. INTRODUCTION

Banks' excess reserves have risen since the 2007-2008 global crises. Liquidity holdings are now far more appealing than before the crisis, as the cost of holding liquidity is significantly lower (Craig & Koepke, 2015). During the economic crisis, short-term financial markets dried up[1], causing severe funding shortfalls for all banks worldwide (Fernandes et al., 2021).To counteract the 2008 recession, the Basel Committee on Banking Supervision constructed different liquidity criteria under Basel III: the net stable funding ratio (NSFR) and the liquidity coverage ratio (LCR)[2]. The net stable funding ratio resolves long-term liquidity imbalances over one year, while the liquidity coverage ratio handles short-term liquidity deficits within 30 days(Le et al., 2020).

The Middle East and North Africa (MENA) area and the banking industry were selected for this investigation for several reasons. Firstly, in the previous decade, the MENA area has experienced various changes, including the liberalization of their economies into the global marketplace, the emergence of the private sector, and the development of bank lending. Secondly, the Application of Basel III criteria in MENA countries has evolved to align bank reforms with a country's degree of financial system complexity. Third, most MENA is an oil-based economy, which draws fresh investment prospects and supplies banks with an increased inflow of funds. Finally, certain MENA economies have experienced financial chaos and political turmoil (Arab spring, unemployment, and debt crises), which have impacted banks' regulatory stances and operating practices and their respective authorities' conduct.

The World Health Organization announced an outbreak of the coronavirus COVID-19 (also known as SARS-CoV-2) in early February 2020. Following events in China and Europe, the global economic consequences of the COVID-19 pandemic became apparent at the end of February (IMF, 2020). For various reasons, we have chosen to focus our attention on measuring the behaviour of banks' funding liquidity (net stable funding ratio) in light of the COVID epidemic and the resulting impact on bank profitability. Firstly, as a function of the economic downturn, lock-ups, and weaker demand for products and services both during and post-pandemic, banks faced increasing credit and default risk worldwide owing to deficiencies in liquidity management and debt payment concerns (Elnahass et al., 2021). Second, lending operations could be curtailed if private market investment and consumption continue to decline and are unlikely to rebound during or after the epidemic, thereby decreasing banks' profit margins (Neef & Schandlbauer, 2021). Therefore, assessing how MENA banks' funding liquidity (NSFR) impacts bank profitability in such an adjustment during the COVID-19

*Address correspondence to this author at the School of Business and Economics, Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia; Tel.: +218925107514; E-mail: muhammedlamroony@gmail.com

[1] As a result of the Lehman Brothers collapse in September 2008, major financial institutions including Merrill Lynch, Morgan Stanley, and Goldman Sachs were suffering huge financial difficulties.

[2] In January 2013, The Basel Committee agreed on the composition of high-quality liquid assets (HQLA) and the specifications for net cash outflows from deposits and contingent liabilities, as well as a period of transition for the implementation of LCR.

pandemic may prevent policymakers and regulators from meeting the same fate they did during the crisis in 2007/08.

The discussion over the relationship between funding liquidity and bank profitability is inadequate due to the various findings. Previous studies fall into three categories. The first argument is in favour of funding liquidity having a detrimental effect on bank profitability (King, 2013). On the other hand, the second category demonstrates the positive effect of funding liquidity (NSFR) on bank profitability (Said, 2018). The third wave of literature demonstrates that a net stable funding ratio will have an insignificant impact on bank profitability (Dietrich et al., 2014). Despite their differences in the empirical methodology techniques, these papers applied a linear relationship between funding liquidity and banking profitability. Following (Bruna et al., 2020), our study claims that the majority of extant studies are burdened by endogeneity problems; consequently, inconsistent findings are observed.

Additionally, heavy-tailed distributions (outliers' characteristics can significantly raise or lower the mean) are likely to bias distribution. Therefore, our study contradicts the prevalent notion of a linear funding liquidity average effect on bank profitability. As a result, assuming a linear approach to describe this relationship may produce misleading results.

. In this context, significant empirical studies have revealed that the banks' profitability is crucially influenced by funding liquidity during the pandemic. This impact has had a severe economic impact and has captured the attention of economists and researchers. Against this backdrop, this raises the basic question of whether the Basel III net stable funding ratio during the COVID-19 pandemic is a sufficient remedy to support and strengthen MENA banks. Our understanding of this critical topic is limited thus far. As a result, our paper takes up this challenge by employing balanced panel data from 117 banks in 14 MENA countries over the period 2015-2020. Explicitly, we try to answer the following questions: (1) Does compliance with Basel III NSFR increase or decrease bank profitability during the COVID-19 crisis? (2) What is the appropriate level of funding liquidity (NSFR) for optimal profitability, and what impact is below and above the threshold?

Our paper contributes to the literature in three important aspects. First, it is one of the few to conduct an empirical investigation of the contemporary interactions between financial liquidity and bank profitability for a sample of MENA banks, as well as to expand the analysis to include the effect of these factors during the COVID-19 pandemic. This paper may also suggest that interactive regulatory mechanisms must be adopted if our study shows that there is a dynamic causality between COVID-19 risk, liquidity, and profitability. Second, unlike the existing literature, our paper aims to demonstrate the relationships between funding liquidity and bank profitability in a nonlinear approach characterized by the presence of threshold effects. The square term of funding liquidity modelling strategy used by (Le et al., 2020) to capture the nonlinear relationship with bank profitability has one significant limitation where the negative ranges of the relationship may differ in absolute impact compared to positive ranges, which can be handled in a threshold model but not a quadratic specification. In addition, (Seo et al., 2019) can handle panel data estimation issues by minimizing multicollinearity and heterogeneity, whereas (Caner et al., 2000) Threshold techniques are incapable of addressing the estimation of panel data and are only capable of cross-section assessment. Therefore our paper fills the gap by applying the novel (Seo et al., 2019) threshold, and this technique has not been used before in analyzing the nonlinear relationship between NSFR and bank profitability. Third, given the MENA region has a strong banking industry with both conventional and hybrid listed banks operating in equivalent macroeconomic circumstances, our article contributes to the body of knowledge by integrating a sample of listed and unlisted banks. We believe this is significant for the results' broader applicability and would present a more accurate representation of the MENA banking system.

The remainder of this paper is organized as follows. Section 2 reviews the related literature and develops the hypotheses. Section 3 presents our empirical strategy. Section 4 describes data, and variable Section 5 describes the results, and Section 6 6 outlines our conclusion.

2. RELATED LITERATURE & EMPIRICAL HYPOTHESES DEVELOPMENT

2.1. Funding Liquidity, COVID-19, and Bank Profitability

Funding liquidity and the COVID-19 threat are two of the most prominent topics covered in the present literature on bank liquidity risk management (Baker et al., 2020; Mergaerts & Vennet, 2016; Pak, 2020). As an illustrative example, (King, 2013) analyzes the most effective processes for meeting the net stable funding ratio standards for a sample of 15 developed nations and finds that bank profitability declines by an average of 70–88 basis points. (Wei et al., 2017) analyzes the role of funding liquidity, such as the net stable funding ratio on bank profitability and social welfare from a theoretical perspective. The result indicates that funding liquidity has a negative effect on bank profitability. (Mergaerts & Vennet, 2016) Investigates the profitability and stability of a representative sample in European banks from 1998 to 2013. The findings indicate that funding liquidity negatively affects bank profitability (return on equity, net interest margin) but has an insignificant connection with return on assets and stability. (Pak, 2020) examines the nexus between net stable funding ratio, profitability and systematic important banks (SIFI) in a sample headquartered in Eurasian Economic Union (EAEU); the findings show that NSFR will adversely influence bank profitability. A recent study published in 2020 (Baker et al., 2020) evaluated the effect of the COVID-19 epidemic on stock prices and firm profitability, and their findings indicated both negative and positive responses to the COVID-19 era. Thus, we form our first hypothesis, suggesting a negative link between funding liquidity and bank profitability during the COVID-19 Pandemic.

H1: net stable funding ratio is negatively associated with banks' profitability during the covid-19 pandemic

2.2. Nonlinear Relationship Between Funding Liquidity and Bank Profitability

Funding liquidity is a critical element that helps determine the performance of the banking industry. Hence, volatility in funding liquidity has precipitous effects on the real economy. The health of a country's banking system is closely linked to the health of the economy. The linkage of funding liquidity to bank profitability and, thus, to the health of the MENA countries' financial system is critical for policy planners. In general, there are two possible sets of hypotheses that banks may take in response to the Basel regulations; On one hand, the trade-off hypothesis proposes that liquidity will lower bank profitability during standard times(King, 2013). On the other hand, the expected bankruptcy cost hypothesis shows that holdings of liquid assets should exhibit a positive relationship with bank profits (Bordeleau & Graham, 2010). In addition, (Delis et al., 2014) propose that bank managers may need to achieve an optimal level of liquidity in order to generate a specific amount of profitability. According to this assumption, major creditors and depositors frequently assist efficient banks. Thus, more efficient banks would maintain less liquidity, as it is easier for them to raise funds through interbank markets and loan sale markets or vice versa (Le et al., 2020). Moreover, (Bordeleau & Graham, 2010) indicated that there is a point beyond which holding further liquidity diminishes a bank's profitability. As a result, we expect funding liquidity to exhibit a nonlinear relationship to bank profitability in which increasing liquidity would improve a bank's profitability through the "expected bankruptcy cost hypothesis".

H2: there is a nonlinear relationship between funding liquidity and bank profitability

2.3. Funding Liquidity, Covid-19, and Bank Profitability

The financial theory emphasizes that Investors' and intermediaries' propensity to contribute liquidity and capital are influenced by risk and uncertainties (Pástor & Veronesi, 2013). Understanding how the coronavirus (COVID-19) pandemic affects financial markets, institutions, and thus the real economy is critical for academics and policymakers. At the beginning of the coronavirus pandemic, governments worldwide implemented extensive quarantine procedures to limit the virus's spread, causing a drop in economic activity, substantial revenue, and income loss for businesses and individuals. As a result, creditworthiness and ability to repay loans were impaired; furthermore, it decreased demand for banking services (Çolak & Öztekin, 2021). Consequently, this situation raised concerns about solvency and liquidity. Many governments and central banks implemented monetary stimulation policies by giving loan guarantees and other financial assistance to inject liquidity into afflicted sectors (Bennedsen, 2020). Past experience shows that pandemics are usually followed by periods of recession, which significantly affect the financial sector's profitability. In this way, we draw our first hypothesis positing that the relationship between funding liquidity and bank profitability during the covid-19 pandemic is negative, as follows:

H3: net stable funding ratio is negatively associated with banks' profitability during the covid-19 pandemic

2.4. Literature Review

2.4.1. Empirical Literature on Funding Liquidity

The impact of funding liquidity on the banking industry has captivated policymakers, bankers, and researchers alike. However, policymakers and economists hold diverse perspectives on the interplay of funding liquidity and bank performance. However, empirical investigations also reported inconsistent findings. In which different banking-specific studies have examined this association using a variety of different econometric techniques. Studies by (King, 2013) for 15 developed countries; (DeYoung & Jang, 2016) for the united of states; (Mergaerts & Vennet, 2016) for 30 European countries; (Wei et al., 2017) for a theoretical model; (Pak, 2020) for three Eurasian Economic Union ; (Le et al., 2020) for the United States ;(Härle et al., 2010) for Europe, have reported that bank profitability and funding liquidity are interrelated negatively, resulting in a decrease in bank profit margins. On the other hand, other papers claim that increased funding liquidity results in increased bank profitability. (Dietrich et al., 2014) examines the NSFR's impact on the profitability of 921 European Continent banks from 1996 to 2010. In contrast to the expectations of the prior studies, the NSFR had an insignificant influence on the sample banks' ROA, ROE, and NIM. In contrast to the prior understanding of the net stable funding ratio, (Said, 2018) discovered a positive correlation between NSFR and bank profitability in eight Malaysian banks from 1960 to 2006. In this paper, we add to the fast-growing literature on the implications of the COVID-19 shock on the financial banking industry and the real economy in MENA countries.

2.4.2. Empirical Literature on the COVID-19 pandemic

(Demirguc-kunt, 2020) Discovered that semi-liquid banks were negatively associated with the COVID-crisis, which in turn resulted in a reduction in lending rates during the first quarters of the pandemic. (Acharya et al., 2021) confirms the negative impact of the COVID epidemic on bank stock returns by conducting a cross-sectional regression on a sample of US banks from January 2020 to 3/23/2020. (Li et al., 2021) investigated the impact of the COVID-19 epidemic on the relationship between non-interest income and bank profitability. They conclude that there is a significant positive relationship between non-interest income and return on assets position. (Li. L et al., 2020), reported a decrease in overall loans to all US banks during the pandemic's first quarter while. (Carletti et al., 2020) Investigated the effects of the COVID-19 epidemic on the profitability of 80,972 Italian firms. The findings indicated that equity and profitability are inversely correlated with the epidemic. In this paper, we study the impact of funding liquidity on bank profitability during the aggregate risk episodes of a covid-19 pandemic. To the best of our knowledge, our study is one of the few investigating the funding risk contribution of MENA bank profitability during the COVID-19 challenge; in so doing, we contribute to the nascent literature on the effects of the COVID-19 shock on banking profitability (Acharya & Steffen, 2020; Chodorow-Reich et al., 2021; Greenwald et al., 2020; Li et al., 2021).

2.4.3. Empirical Literature on Bank Profitability

Two literature sections studied the key drivers of banks' profitability: one is concerned with banking profitability in one particular nation, and the other with cross-country disparities. (Bouzgarrou et al., 2018) Investigates the performance of 170 French banks via ownership. The results indicate that foreign banks gained more profits compared to domestic banks in France. Bank capital positively impacts French banks' return on assets but has an adverse impact on return on equity and net interest margin. Finally, large banks and banks with high levels of loan losses will have lower profitability. (Hoffmann, 2011) discovered a significant positive relationship between bank profitability and capital position in US banks, meaning that banks with a high capital posture will enhance bank profitability in the United States between 1999 and 2013. (Tan, 2016) investigates the drivers of bank profitability in China between 2003 and 2013. The result concludes that while banks' total assets and credit risk are associated with lower profitability, capital adequacy, inflation, and diversification consistently impact bank profitability favourably. During the financial crisis, (Chronopoulos et al., 2015) discovered a significant increase in the persistence of profits in US banks.

Cross-country studies are the second stand in the literature on bank profitability; these studies are relatively infrequent in the literature. (Djalilov & Piesse, 2016) Investigate the drivers of profitability of the Central and Eastern European (CEE) and Baltic banks (the former USSR). The findings indicate that both bank size and equity positively affect the level of return on assets of both nations' banks. In contrast, credit losses affect the profitability of the Baltic banks only. By examining the criteria that detect banks' efficiency and profitability in 39 OECD countries, (Bitar et al., 2018) discovered that implementing new Basel capital requirements has a detrimental effect on bank profitability. In 1998–2012, (Dietrich et al., 2014) examined the determinants of bank profitability using a sample of 10165 banks across 118 countries. The results indicate that profitability factors differ greatly from one country to another based on the nation's income level. (Petria et al, 2015) examined the determinants of bank profitability using a sample of 27 European countries. They observed that capital adequacy and GDP growth have a beneficial impact on profitability, whereas the high amount of non-performing loans accompanied by a high-efficiency ratio will adversely impact bank profitability.

Due to its significance in bank profitability, funding liquidity might significantly impact banks' performance during the COVID-19 pandemic; however, no research has so far addressed this issue. Similarly, does the link between financial liquidity and profitability exhibit non-linearity? These concerns would be of particular interest to policymakers, investors, and other bankers

Table 1 Numbers of Banks, Development Levels, and Geographical Areas.

No.	Country	Number of banks	Development level	Geographical area
1	UAE	14	Developing	Middle East
2	KSA	13	Developing	Middle East
3	KUWAIT	12	Developing	Middle East
4	QATAR	12	Developing	Middle East
5	JORDAN	20	Developing	Middle East
6	Libya	5	Developing	Middle East
7	Egypt	10	Developing	Middle East
8	Iran	2	Developing	Middle East
9	LEBANON	6	Developing	Middle East
10	MOROCCO	3	Developing	Middle East
11	OMAN	7	Developing	Middle East
12	SYRIA	9	Developing	Middle East
13	PALESTINE	4	Developing	Middle East

Note: our study adopted the World Bank and IMF 2016 country classifications based on development and geography.

3. METHODOLOGY

3.1. Model Specification

This section describes the econometric model and highlights the most significant variables. The main goal of this study is first to model potential aspects that drive the amount to which funding liquidity might influence bank profitability during the Covid-19 crisis, and second, we examine whether a threshold indeed emerges between funding liquidity and bank profitability in MENA countries. As a result, this study calculates the effect of funding liquidity on bank profitability in MENA states using both dynamic panel threshold and dynamic two-step system GMM panel estimation approaches. Numerous challenges will develop throughout the estimation process, such as endogeneity, unobservable heterogeneity, and the persistence of profitability (lagged dependent variable). Given the dynamic nature of banks' profitability and economic behaviour, the implications of the net stable funding ratio (NSFR) on banks' profitability in 13 MENA countries are estimated using the (Arellano & Bover, 1995) two-step GMM estimator.

First, Equation (1) is estimated by applying dynamic GMM[3] panel estimation techniques to evaluate this association. Following (Dietrich et al., 2014), the most resilient model is adopted.

$$lnProfitability_{it} = \alpha + \beta 1 lnProfitability_{t-1}$$

$$+ \beta 2 lnNSFR_{it} + \sum_{k=1}^{k} \beta_k X_{i,t}^{k} + \sum_{m=1}^{m} \beta_m X_{i,t}^{m} + c + \delta_{i,t} + \omega_{i,t} \quad (1)$$

We extend the body of knowledge on the nexus between funding liquidity-bank profitability by considering the covid-19 pandemic era. Following (Neef & Schandlbauer, 2021), this study used a covid dummy variable to represent the

[3] (Huang et al., 2020) note that in the presence of heteroskedasticity, GMM estimator outperform other instrumental variables approaches such as 2SLS. Consequently, this study employs GMM.

COVID era, and it is one for 2020 and zero; otherwise; as a result, the empirical model is re-specified in equation 2.

$$lnROE_{it} = \alpha + \beta 1 lnROE_{t-1} + \beta 2 lnNSFR_{it} \times COVID19 + \sum_{k=1}^{k} \beta_k X_{i,t}^{k} + \sum_{m=1}^{m} \beta_m X_{i,t}^{m} + c + \delta_{i,t} + \omega_{i,t} \quad (2)$$

Where i, j,t, and t indices denote bank, country, and time, respectively. ROE is the profitability of banks. α is the constant term. NSFR is the funding liquidity; $X_{i,t}^{k}$is a vector of bank-specific variables of bank i at time t, $X_{i,t}^{m}$ is a vector of macroeconomic variables of country j at time t, the COVID-19 is the covid-19 pandemic dummy, C is a constant term, $\delta_{i,t}$ Are a year and country fixed effects to capture unobserved heterogeneity among MENA countries. $\omega_{i,t}$ Is the disturbance term comprised of an unobserved bank-specific effect (θ_{it}) and an idiosyncratic error (ε_{it}), Secondly, in this study, we investigate if funding liquidity is related to bank profitability in a nonlinear manner. Furthermore, if it exists, what is the optimum funding liquidity threshold? Our paper contributes to the body of knowledge by employing the novel dynamic panel threshold proposed by (Seo et al., 2019) to answer this question. Therefore the model is specified as follows:

$$lnROE_{it} = (\alpha_1 + \beta_1 ROE_{t-1} + \beta_2 NSFR_{it} + \beta_3 \text{NNI}'_{it} + \beta_4 TIER1'_{it} + \beta_5 SIZE'_{it} + \beta_6 NNI'_{it} + \beta_7 GDP_{it} + \beta_8 \text{INF}'_{it} + \mu_{it} + \varepsilon'_{it}) 1\{q'_{it} \leq Y\} (= \alpha_1 + \beta_1 ROE_{t-1} + \beta_2 NSFR_{it} + \beta_3 \text{NNI}'_{it} + \beta_4 TIER1'_{it} + \theta\beta_{25} SIZE'_{it} + \beta_6 NNI'_{it} + \beta_7 GDP_{it} + \beta_8 \text{INF}'_{it} + \mu_{it} + \varepsilon'_{it}) 1\{\{q'_{it} \geq Y\} + \quad (3)$$

Equation (3) is estimated using the first difference GMM[4], which takes into account the regressors' and transition variables' endogeneity. Where, 1. Represents the indicator function, q_{it} Represents the transition variable, and Y is the model's threshold parameter.

4. DATA AND VARIABLE

This study employed balanced unit-level panel data across 117 banks in 13 Middle East North African countries (MENA). The sample covers 2015–2020. following (Köhler, 2014), our study examines a data set[5] that includes all types of banks: Commercial banks, Savings banks, and Private banking. Islamic banks are exempt from the sample due to the fact that NSFR has different calculations and measures (Ashraf et al., 2016). To determine bank profitability, our data was gathered from the Orbis Bank focus database.

4.1 bank profitability: The main goal of this study is to examine the effect of funding liquidity on bank profitability in MENA regions. Return on equity (ROE) is a commonly used measure[6] of bank profitability. It refers to the profit banks generate from their lending/funding activities. Following (Dietrich et al., 2014; King, 2013), this study adopted ROE as a profitability measure.

4.2. Funding Liquidity

net stable funding ratio (NSFR) is the prime indicator of funding liquidity, commonly used in earlier studies (Dahir et al., 2019; DeYoung et al., 2018; Dietrich et al., 2014; King, 2013; Pak, 2020) in this paper we use the (NSFR_2014) version, in Equation 4, the following formula is used to calculate funding liquidity:

$$\frac{\text{equity} + \text{long term funding} + 0.9 * \text{cust saving dep} + 0.8 * \text{cust current dep} + 0.5 * \text{short} - \text{term borrowing}}{0.5 * \text{securities and short term invesment} + 1 * \text{other assets} + 0.85 * \text{loans} + 0.05 * \text{off} - \text{balance sheet item}} \quad (4)$$

4.3. Control Variables

Following (Bongini, et al., 2019; Carletti et al., 2020; Fernández, et al., 2022; Goddard et al., 2004; Gugler & Peev, 2018; Hu & Zhang, 2021), this paper integrated several bank-specific control variables, including bank loan loss reserves, bank capital, leverage, non-performing loans, and revenue diversification. The non Interest income functions as a proxy for revenue diversification; leverage is measured by dividing tangible equity by total assets and bank capitalization as the ratio of tier1.

5. RESULTS AND INTERPRETATION

5.1. Summary Statistics and Correlation Matrix

We begin our discussion of the empirical analysis findings by reviewing the descriptive statistics in Table **2**. We report the mean, median, minimum, maximum, standard deviation, and percentile values of all variables used in our study. There are 117 MENA banks included in the sample between 2015 and 2020 and 5728 total observations. The mean value of ROE is 4.14, and the mean value of NSFR is 1.16, with a significant degree of dispersion across banks, ranging from 0.092 to 200. However, our study eliminates outliers, which comprise the upper and bottom 0.5 percent of the risk measure distribution since the tails of the distribution frequently contain implausible values.

Table **3** shows the Pearson correlation coefficient. We discover that the explanatory variable's coefficient is less than (0.70), indicating that multicollinearity and autocorrelation are not Important debates since the correlation coefficients are less than (0.80, 0.90) respectively Kennedy (2008).

5.2. Basic Linear Analysis of the Nexus between Funding Liquidity and Bank Profitability During the COVID-19 Pandemic

This subsection presents the results of our estimates. The first objective of this study is to analyze the association between funding liquidity and bank profitability in MENA countries during the COVID-19 pandemic. Table 4 summarizes the findings of using the two-step system GMM approach from 2015 to 2020. The GMM estimator is consistent since it does not reject the null hypothesis of the Hansen test and confirms the presence of first-order serial correlation (AR1) and the absence of second-order serial correlation (AR2). In so doing, inferences can be reached based on our

[4] In this paper, we estimate the unknown parameters using first difference generalized method of moments (GMM). For further information see (Seo et al., 2019)

[5] We omit from our initial dataset banks that do not provide sufficient detail about their Basel III net stable funding ratio to the Orbis Bank focus database

[6] According to (Mamun et al., 2021), adopting the lagged value avoids endogeneity issues. So we calculate ROE using lagged total book value of assets.

estimates. The significance of the lagged dependent variables (return on equity) in MENA countries proved the usefulness of the dynamic model. As a result, the robustness of our estimates employing the two-step dynamic GMM approach is verified. The most economically significant impact is observed when a one-unit jump in lagged bank profitability improved the return on equity by (0.525). Additionally, the system GMM estimator produces more persuasive results; the interaction coefficient between funding liquidity and COVID-19 is 1.35, negative, and highly significant at the 1% level, indicating that the effect of the net stable funding ratio on bank return on equity in MENA countries is economically significant, as a unit increase in the NSFR reduces bank profitability by nearly 1.35 over the sample period of 2015-2020. The banking industry in MENA economies suffers clear funding liquidity risk, as the coefficient of liquidity risk exceeds the threshold value of 1. This conclusion corresponds to the previous literature (King, 2013).

Table 2 Descriptive Statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
ROE	821	4.144	199.676	-5692.73	144.89
NSFR	822	1.165	7.106	.092	200.134
TIER1	817	3528.787	4725.253	-4369.46	25706
NNI	822	52.045	545.481	-397.209	15658.8
Leverage ratio	822	12.503	4.822	-3.217	39.617
Loan loss reserves	804	126.217	124.503	16.473	1175.79
Non-performing loans	820	715.568	1118.07	2.327	9526.16

Note: This table lists summary statistics for the key variables in the sample, which includes bank headquarters In MENA countries between 2015 and 2020. ROE = Return on Equity, NSFR = Net stable funding ratio, Tier1 = bank capital, BI + NNI: revenue diversification, total assets= bank size, GDP = Gross Domestic Product, INF= annual inflation rate

Table 3 Correlation Matrix of the Variables.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ROE	1.000						
(2) NSFR	0.008	1.000					
(3) TIER1	0.042	-0.049	1.000				
(4) NNI	0.006	0.010	-0.030	1.000			
(5) leverage ratio	0.133	0.049	-0.096	-0.075	1.000		
(6) LLR	0.006	-0.031	0.058	-0.025	-0.040	1.000	
(7) NPL	-0.031	-0.041	0.675	-0.026	-0.167	0.058	1.000

Notes: ROE= bank return on equity; NSFR =net stable funding ratio; Tier1 bank capital; NNI = Net interest income ; LLRNPL = loan loss reserves; Leverage = bank leverage

Table 4. Using the Two-Step System GMM.

ROE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L.ROE	.525	.143	3.66	0.01	.244	.806	***
NSFR×COVID	-1.358	.453	-3.00	.003	-2.246	-.471	***
TIER1	.002	.001	1.54	.004	0	.004	***
Leverage ratio	7.447	1.972	3.78	125	3.581	11.313	
NNI	.011	.013	0.87	.386	-.014	.036	
NPL	-.017	.009	-1.98	.048	-.034	0	**
LLR	.037	.031	1.21	.226	-.023	.098	
Constant	-33.396	35.163	-0.95	.342	-102.314	35.522	

Mean dependent var	1.951	SD dependent var	222.095
Number of obs	663.000	Chi-square	2830.469
*** p<.01, ** p<.05, * p<.1			

Notes: Regression model results demonstrate the interaction between NSFR, COVID-19, and bank profitability. Estimates are based on the two steps GMM approach (2sys GMM). The data represent a panel of the MENA banking systems. In order to account for the lags and instruments, the estimates were run with 663 observations.

The variables used to determine the bank-specific impacts in this investigation confirm that the results are economically significant in the expected direction. Bank capital tier 1, non-interest income, non-performing loans, leverage, and loan loss reserves are all used in this study as bank-specific characteristics. First, bank profitability has a positive and significant relationship with tier 1 capital at the 1% level, indicating that well-capitalized banks in MENA likely increase their bank profits. This finding is consistent with previous findings showing that surpassing Basel III's minimum regulatory capital requirements will maintain capital levels, minimize the risk of failures and improve the solvency and stability of the banking system (Ozili, 2017). Non-performing loans have a coefficient of -0.017, which is significantly negative, meaning that each unit increase in NPLs reduces bank profitability by almost - (0.017) throughout the 2015-2020 sample period. These findings are consistent with the fact that banks bear interest on loans they cannot collect; these issues have a detrimental impact on banks, causing breakups in their financial structures. When non-performing loans are deducted from net interest income, this reduces the bank's profit margin (Yurttadur et al., 2019). The estimated coefficients for net interest income, loan loss reserves, and bank leverage are statistically insignificant, demonstrating that revenue diversification, loan loss reserves, and bank equity/total assets ratios are not relevant to profitability in MENA banks. These variables' insignificant impact could be attributable to the smaller sample size and the limited degrees of freedom. One other possible explanation is that fundamental factors associated with economic volatility significantly impact the profitability of non-listed banks included in our sample. To summarize, the dynamic GMM estimation indicates that funding liquidity has a substantial adverse effect on MENA banks' profitability (return on equity) during the COVID epidemic. These results support our first and third hypotheses, H1 and H3.

5.3. Nonlinear Relationship Between Funding Liquidity and Bank Profitability

The aforementioned literature indicates that funding liquidity has different impacts on bank profitability; hence the nexus, between net stable funding liquidity (NSFR) and bank profitability may be a nonlinear relationship. Therefore, detecting the threshold effect of NSFR on bank profitability is highly relevant. It should be noted that the methodology of the dynamic panel threshold is built on the fundamental principles of GMM (Bolarinwa et al., 2021); therefore, the model in section 5.2 was examined for appropriateness of instrumental variables, endogeneity, and autocorrelation issues. As a result, the autocorrelation (AR), Sargen, and Hansen tests showed that the GMM was suitable and robust for the regression. Table **5** shows the findings of the estimation of the dynamic panel threshold model (Seo et al., 2019), The implications of the results will be discussed in order to understand the impact of funding liquidity on the level of bank profitability both below and above the optimal thresholds. It is important to note that the NSFR ratio is used to determine funding liquidity. Our methodology establishes two regimes for MENA banks using a dynamic panel threshold: one for banks with low funding liquidity (below threshold) and another for banks with high funding liquidity (above threshold). To ascertain the threshold relationship between funding liquidity and bank profitability, the linearity test is applied; this test is carried out using the fast bootstrap algorithm robust procedure, which can withstand the effect of nonparametric independent, identically distributed (IID) randomness under the null and alternative hypotheses, as shown in equations (5) and (6), respectively.

$$H0: \delta 0 = 0, \text{ for any } \quad \gamma \in \Gamma \quad (5)$$

$$H1: \delta 0 \neq 0, \text{ f or any } \quad \gamma \in \Gamma \quad (6)$$

Herein, Γ is the parameter space of γ. The linearity test results indicate that the model isn't linear, as the indicators are significant at 1%. Our findings support the preceding expectations, as the coefficient of the lagged dependent variable (bank profitability) is statistically significant, indicating that return on equity (ROE) is dynamic in the MENA region, which justifies our choice of the dynamic threshold. Furthermore, Table **5** results support the expected bankruptcy theory when the NSFR ratio falls below the ideal threshold level of 47%, implying that funding liquidity reduces MENA banks' return on equity. In other words, banks with a low NSFR ratio are more attributable to low-profit margins; these findings support H2 and corroborate the findings of (King, 2013).

On the contrary, once this threshold is surpassed (high funding liquidity), the impact flips, with NSFR positively affecting bank profitability. In order to benefit from an expansion in the bank return on equity above the threshold, the NSFR ratio in MENA banks should not fall behind 47%. Thus, policymakers and governments in MENA countries must constantly monitor the optimal threshold of the NSFR ratio (47%) and continue to develop their banking sector even if their policies do not seem to affect the profitability level at the present stage during the COVID pandemic era. Additionally, we explain that certain other variables have an impact on bank return on equity either below or above the threshold.

The findings reveal that revenue diversification (NNI), bank size (natural logarithm of total assets), and GDP are significantly and positively associated with bank profitability (ROE) below the optimal thresholds.

Table 5. Dynamic Threshold Regression Results.

ROE	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Below threshold Lag_ ROE	0.099	0.007	14.900	0.000	0.086	0.112
NSFR	-473.890	195.470	-2.420	0.015	-857.004	-90.777
NNI	13.018	0.208	62.570	0.000	12.610	13.425
TIER1	-0.030	0.014	-2.090	0.036	-0.057	-0.002
lSIZE	157.048	31.328	5.010	0.000	95.646	218.449
GDP	0.000	0.000	2.330	0.020	0.000	0.000
INF	-15.386	1.434	-10.730	0.000	-18.195	-12.576
cons	1733.885	212.985	8.140	0.000	1316.442	2151.328
above threshold						
Lag_ ROE	-0.517	0.025	-21.100	0.000	-0.566	-0.469
NSFR	473.697	195.516	2.420	0.015	90.493	856.900
NNI	-13.022	0.103	-126.350	0.000	-13.224	-12.820
TIER1	0.028	0.015	1.820	0.069	-0.002	0.057
lSIZE	-138.138	27.953	-4.940	0.000	-192.924	-83.351
GDP	-0.000	0.000	-2.020	0.044	-0.000	-0.000
INF	15.685	1.619	9.690	0.000	12.512	18.858
Threshold	0.469	0.136	3.450	0.001	0.203	0.736
post estimation test						
kink slope |	-5807.901	103.5105	-56.11	0.000	-6010.778	-5605.024

7 sample(s) are ignored further due to missing values N = 130, T = 6 Panel Var. = code Time Var. = year Number of moment conditions = 38 Bootstrap p-value for linearity test = 0.

Once they are above the threshold value, they will have an opposite coefficient. Conversely, bank capital (TIier1 capital) will be negatively significant below the threshold and positively significant above the threshold, implying that banks with higher capital buffers benefit from economies of scale by having higher retained earnings instead of benefiting from expensive governmental bailouts; these findings are in line with (Bitar et al., 2018). Regarding the effect of macroeconomic variables, the findings indicate that inflation and GDP impact are significantly negative and positive, respectively, with the level of bank return on equity below the threshold. Conversely, these associations will have the opposite coefficients above the threshold, implying any increase in the inflation rate leads to an increase in the interest expenses, causing greater vulnerability and the widespread inability of borrowers to repay their loans as more borrowers face financial distress and become insolvent. This result is convergent to the works of (Klein, 2013; Mpofu & Nikolaidou, 2018). Lastly, our study also identifies whether Ordinary jumps emerge during the estimation. Indeed, the results in table 5 verified the presence of kink, as the coefficient is significant at 1 %, indicating the availability of (ordinary jumps) aside from the threshold in the model.

5.4. Robustness Check

In this section, we examine the robustness of our baseline results. In each subsection, we exploit a different approach to assess the robustness of the main results. First, we estimate equation 2 with the GMM model by using alternative measures of bank profitability, and second, we conduct several additional robustness checks to prove the aforementioned threshold analysis outcomes in equation 3.

5.4.1. Alternative Measures of Profitability

In the previous assessment, we considered the return on equity (ROE) as our primary indicator of profitability; in this section following (Azad et al., 2020), we will focus on another indicator for measuring bank profitability, namely the net interest margin (NIM). Table **6** shows the result of the two-step system GMM from Eq. (1) estimations using different profitability measures. The outcome is consistent with our primary findings (funding liquidity during the COVID-19 era is significant and negative). Additionally, the results indicate that banks with a higher net stable funding ratio have a tendency to reduce their net interest margins during

Table 6. Using Alternative Proxy for Bank Profitability (Robustness Test).

NIM	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
L.NIM	.716	.04	17.72	0	.637	.795	***
NSFR×covid-19	-.002	.001	-3.21	.001	-.003	-.001	***
NPL	0	0	0.56	.578	0	0	
TIER1	0	0	-1.18	.237	0	0	
NNI	0	0	-11.40	0	0	0	***
Leverage ratio	.004	.006	0.61	.545	-.008	.015	
LLR	0	0	-0.53	.595	-.001	0	
Constant	.87	.117	7.45	0	.642	1.099	***
Mean dependent var		3.079	SD dependent var		1.318		
Number of obs		663.000	Chi-square		24381.045		
*** p<.01, ** p<.05, * p<.1							

Notes: NIM= net interest margin; N SFR=net stable funding ratio; NNI = Net interest income; LLR = loan loss reserves, NPL= non-performing loans; leverage ratio = bank size.

the covid-19 period, which validates (king 2013) evidence that NSFRs tend to de-risk banks during difficult times but will have a reverse effect on bank profitability.

5.4.2. Nonlinear Relationship between Funding Liquidity and bank Profitability

5.4.2.1. Considering Alternative Estimation Technique.

In order to improve the explanation of the non-linearity between funding liquidity and bank Profitability for MENA countries, our model is modified to verify the robustness of the results by estimating a static threshold regression, and the dependent variable in the estimation remains the ROE. As expected, the funding liquidity coefficients are significant and positive below the threshold and significant and negative above the threshold in MENA banks. Therefore, these results are in agreement with our main findings that funding liquidity will positively influence profitability below the optimal threshold and vice versa.

5.4.2.2. Considering Alternative Liquidity Indicator

As a second robustness check, we re-estimate our equations by substituting the NSFR for the liquidity coverage ratio provided by Basel III (LCR). Once again, our findings in table 8 held steady, as the liquidity coverage ratio coefficient is significantly negative below the threshold and significantly positive above the threshold. Likewise, most control variable coefficients remained unchanged (both in terms of sign and statistical significance).

Table 7. Static Threshold Estimations.

ROE	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Below threshold NSFR	357.5152	175.7151	2.03	0.042	13.12	701.9105
NPL	-.0414556	.0257653	-1.61	0.108	-.0919547	.0090436
tier1	.0043893	.0091567	0.48	0.632	-.0135575	.0223361
Leverage ratio	-9.703796	4.172568	-2.33	0.020	-17.88188	-1.525713
NNI	12.87608	.1530332	84.14	0.000	12.57614	13.17602
LLR	-.0182143	.0449677	-0.41	0.685	-.1063494	.0699207
cons_d	271.6021	69.47313	3.91	0.000	135.4373	407.767
above threshold NSFR	-357.3689	175.6925	-2.03	0.042	-701.7199	-13.01785
NPL	.0294488	.0390009	0.76	0.450	-.0469916	.1058891
tier1	.0007548	.0123081	0.06	0.951	-.0233686	.0248783

leveragetai	14.59321	4.409168	3.31	0.001	5.951394	23.23502
NNI	-12.87968	.073686	-174.79	0.000	-13.0241	-12.73526
LLR	.1273129	.1072091	1.19	0.235	-.082813	.3374388
Threshold	.5190241	.1340828	3.87	0.000	.2562266	.7818215

N = 124, T = 6, Panel Var. = code, Time Var. = year, Number of moment conditions = 35, Bootstrap p-value for linearity test, _b = refers to the below threshold, d= refers to the above threshold.

Table 8. Using an Alternative Liquidity Indicator.

roe	**Coef.**	**Std.Err.**	**z**	**P>z**	**[95%Conf.**	**Interval]**
Below threshold Lag ROE	0.049	0.062	0.800	0.425	-0.072	0.170
LCR	-17.078	6.679	-2.560	0.011	-30.168	-3.988
NNI	11.607	1.079	10.760	0.000	9.492	13.721
TIER1	0.024	0.008	2.940	0.003	0.008	0.040
LLR	0.742	0.206	3.590	0.000	0.337	1.146
GDP	-0.000	0.000	-0.800	0.426	-0.000	0.000
INF	6.987	2.467	2.830	0.005	2.153	11.821
cons_d **above threshold**	403.266	177.314	2.270	0.023	55.736	750.795
Lag ROE	-0.497	0.146	-3.400	0.001	-0.783	-0.211
LCR	15.868	7.131	2.230	0.026	1.892	29.845
NNI	-11.612	0.849	-13.670	0.000	-13.277	-9.948
TIER1	-0.015	0.011	-1.340	0.181	-0.036	0.007
LLR	-0.595	0.251	-2.370	0.018	-1.086	-0.103
GDP	-0.000	0.000	-0.800	0.424	-0.000	0.000
INF	-8.356	3.116	-2.680	0.007	-14.463	-2.250
Threshold	26.137	2.072	12.620	0.000	22.076	30.198

13 sample(s) are ignored further due to missing values N = 124, T = 6 Panel Var. = code Time Var. = year Number of moment conditions = 38 Bootstrap p-value for linearity test = 0.

5.4.2.3. Excluding GDP

As a final robustness check, following (Kabir et al., 2018), this study eliminates the GDP from the control variables. Our results in table **9** remain unchanged, where funding liquidity (NSFR) is significantly negative below the threshold and vice versa above the threshold. We are thus able

6. CONCLUSION AND POLICY IMPLICATIONS

Although funding liquidity is crucial to the banking industry, few researchers have examined its potential nonlinear relationship with bank profitability during the COVID-19 era. This paper assesses panel data from 117 banks in 13 MENA countries over five years, from 2015 to 2020. This study applies two distinct methods to understand the factors affecting the linkage between funding liquidity and bank profitability: the two-step system GMM estimator and a nonlinear (dynamic and static panel threshold). The system GMM's findings indicate that the interaction between the COVID-19 epidemic and net stable funding liquidity (NSFR) has a significant negative effect on bank return on equity. Furthermore, this paper explores whether funding liquidity has a nonlinear relationship with bank profitability. The novel (Seo et al., 2019) dynamic panel threshold model revealed that bank profitability is more sensitive to funding liquidity as evaluated by NSFR below the optimal threshold.

Moreover, the results indicate that non-interest income and loan loss reserves contribute to the bank's profitability. By exceeding ideal thresholds, we discovered that funding liquidity enhances bank profitability. In contrast, we observed that funding liquidity negatively influenced bank profitability when it crossed the optimal thresholds. The findings from this study are essential for policy formulations in MENA countries for coping with bank profitability during the

Table 9. Eliminating GDP from Control Variable.

roe	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
Below threshold Lag ROE	0.018	0.014	1.330	0.184	-0.009	0.045
NSFR	-376.650	223.557	-1.680	0.092	-814.814	61.513
NNI	12.399	0.310	39.940	0.000	11.791	13.008
TIER1	-0.016	0.007	-2.300	0.021	-0.029	-0.002
lSIZE	164.006	31.048	5.280	0.000	103.154	224.858
INF	4.182	2.382	1.760	0.079	-0.487	8.850
above threshold Lag ROE	-0.519	0.051	-10.130	0.000	-0.619	-0.418
NSFR	377.074	223.624	1.690	0.092	-61.222	815.369
NNI	-12.404	0.105	-117.620	0.000	-12.611	-12.198
TIER1	0.020	0.007	2.960	0.003	0.007	0.033
lSIZE	-154.264	28.345	-5.440	0.000	-209.819	-98.709
INF	-5.156	2.871	-1.800	0.072	-10.783	0.471
threshold	0.683	0.258	2.650	0.008	0.177	1.189

7 sample(s) are ignored further due to missing values N = 130, T = 6 Panel Var. = code Time Var. = year Number of moment conditions = 34 Bootstrap p-value for linearity test = 0.

COVID crisis. First, we establish that there are threshold levels at funding liquidity that affects bank profitability in MENA countries. This shows that the widely held notion of a linear relationship, which is prevalent in the existing research, may not be valid. Policymakers, especially below the optimum threshold, are thus urged to continue building their bank sectors despite the fact that current levels do not affect the profit margins of MENA banks.

Conversely, once MENA banks reach the optimal threshold criteria, funding liquidity will diminish the level of profitability. In this case, policymakers and governments are urged to follow the Federal Reserve's path and exempt small banks from Basel III's liquidity standards, particularly during severe financial times (COVID-19 pandemic). Additionally, central banks and regulators in this region should continue to supervise banks, particularly (SIFI) banks, which demand a higher level of funding liquidity and capital. Concerning the NSFR standards, in order to maximize bank profitability, the net stable funding ratio in MENA banks should not exceed the optimal threshold level, which is 53.5% percent.

AUTHOR STATEMENT

As confirmed, our study is based on authentic research and has not been published or authored anywhere else. All the authors who contributed to this paper declare that there is no conflict of interest with any other individual or entity.

DECLARATION OF COMPETING INTEREST

There is no conflict of interest.

DATA AVAILABILITY

Data will be made available on request.

REFERENCES

Acharya, V. V., Engle, R. F., & Steffen, S. (2021). Why Did Bank Stocks Crash during COVID-19? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3799590

Acharya, V. V., & Steffen, S. (2020). The Risk of Being a Fallen Angel and the Corporate Dash for Cash in the Midst of COVID. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3704158

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics*, *68*(1), 29–51. https://doi.org/10.1016/0304-4076(94)01642-D

Ashraf, D., Rizwan, M. S., & L'Huillier, B. (2016). A net stable funding ratio for Islamic banks and its impact on financial stability: An international investigation. *Journal of Financial Stability*, *25*, 47–57. https://doi.org/10.1016/j.jfs.2016.06.010

Azad, A. S. M. S., Azmat, S., & Hayat, A. (2020). What determines the profitability of Islamic banks: Lending or fee? *International Review of Economics and Finance*, (August 2018). https://doi.org/10.1016/j.iref.2019.05.015

Baker, S. R., Bloom, N., Davis, S. J., Kost, K., Sammon, M., & Viratyosin, T. (2020). The unprecedented stock market reaction to COVID-19. *Review of Asset Pricing Studies*, *10*(4), 742–758. https://doi.org/10.1093/rapstu/raaa008

Bennedsen. (2020). www.econstor.eu. *Global Labor Organization (GLO)*.

Bitar, M., Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: Evidence from OECD countries. *Journal of International Financial Markets, Institutions and Money*, *53*, 227–262. https://doi.org/10.1016/j.intfin.2017.12.002

Bolarinwa, S. T., Olayeni, R. O., & Vo, X. V. (2021). Is there a nonlinear relationship between non-performing loans and bank profitability? Evidence from dynamic panel threshold. *Managerial and Decision Economics*, *42*(3), 649–661. https://doi.org/10.1002/mde.3262

Bongini, P., Cucinelli, D., Luisa, M., Battista, D., & Nieri, L. (2019). Profitability shocks and recovery in time of crisis evidence from European banks. *Finance Research Letters*, *30*(September 2018), 233–239. https://doi.org/10.1016/j.frl.2018.10.003

Bordeleau, É., & Graham, C. (2010). The Impact of Liquidity on Bank Profitability. *Bank of Canada Working Paper, No. 2010, 38*, 1–22. Retrieved from http://www.bankofcanada.ca/wp-content/.../12/wp10-38.pdf

Bouzgarrou, H., Jouida, S., & Louhichi, W. (2018). Bank profitability during and before the financial crisis: Domestic versus foreign banks. *Research in International Business and Finance*, *44*, 26–39. https://doi.org/10.1016/j.ribaf.2017.05.011

Bruna, M. G., Đặng, R., Ammari, A., & Houanti, L. H. (2020). The effect of board gender diversity on corporate social performance: An instrumental variable quantile regression approach. *Finance Research Letters*, (August), 101734. https://doi.org/10.1016/j.frl.2020.101734

Caner, M., & Hansen, B. E. (2004). Variable instrumental estimation of a threshold University of Pittsburgh. *Econometric Theory*, *20*(5), 813–843. https://doi.org/10.1017/S026646660420501

Carletti, E., Oliviero, T., Pagano, M., Pelizzon, L., & Subrahmanyam, M. G. (2020). The COVID-19 shock and equity shortfall: Firm-level evidence from italy. *Review of Corporate Finance Studies*, *9*(3), 534–568. https://doi.org/10.1093/rcfs/cfaa014

Chodorow-Reich, G., Darmouni, O., Luck, S., & Plosser, M. (2021). Bank liquidity provision across the firm size distribution. *Journal of Financial Economics*, (April). https://doi.org/10.1016/j.jfineco.2021.06.035

Chronopoulos, D. K., Liu, H., McMillan, F. J., & Wilson, J. O. S. (2015). The dynamics of US bank profitability. *European Journal of Finance*, *21*(5), 426–443. https://doi.org/10.1080/1351847X.2013.838184

Craig, B. R., & Koepke, M. (2015). Excess Reserves: Oceans of Cash. *Economic Commentary (Federal Reserve Bank of Cleveland)*, 1–4. https://doi.org/10.26509/frbc-ec-201502

Dahir, A. M., Mahat, F., Razak, N. H. A., & Bany-Ariffin, A. N. (2019). Capital, funding liquidity, and bank lending in emerging economies: An application of the LSDVC approach. *Borsa Istanbul Review*, *19*(2), 139–148. https://doi.org/10.1016/j.bir.2018.08.002

Delis, M. D., Hasan, I., & Tsionas, E. G. (2014). The risk of financial intermediaries. *Journal of Banking and Finance*, *44*(1), 1–12. https://doi.org/10.1016/j.jbankfin.2014.03.024

Demirguc-kunt, R. (2020). Banking Sector Performance During the COVID-19 Crisis, (August).

DeYoung, R., Distinguin, I., & Tarazi, A. (2018). The joint regulation of bank liquidity and bank capital. *Journal of Financial Intermediation*, *34*(January), 32–46. https://doi.org/10.1016/j.jfi.2018.01.006

DeYoung, R., & Jang, K. Y. (2016). Do banks actively manage their liquidity? *Journal of Banking and Finance*, *66*, 143–161. https://doi.org/10.1016/j.jbankfin.2015.11.013

Dietrich, A., Hess, K., & Wanzenried, G. (2014). The good and bad news about the new liquidity rules of Basel III in Western European countries. *Journal of Banking and Finance*, *44*(1), 13–25. https://doi.org/10.1016/j.jbankfin.2014.03.041

Djalilov, K., & Piesse, J. (2016). Determinants of bank profitability in transition countries: What matters most? *Research in International Business and Finance*, *38*, 69–82. https://doi.org/10.1016/j.ribaf.2016.03.015

Elnahass, M., Trinh, V. Q., & Li, T. (2021). Journal of International Financial Markets , Institutions & Money Global banking stability in the shadow of Covid-19 outbreak. *Journal of International Financial Markets, Institutions & Money*, *72*, 101322. https://doi.org/10.1016/j.intfin.2021.101322

Fernandes, G., Mendes, L. dos S., & Leite, R. de O. (2021). Cash holdings and profitability of banks in developed and emerging markets. *International Review of Economics and Finance*, *71*(February 2020), 880–895. https://doi.org/10.1016/j.iref.2020.10.018

Fernández-Aguado, P. G., Martínez, E. T., Ruíz, R. M., & Ureña, A. P. (2022). Evaluation of European Deposit Insurance Scheme funding based on risk analysis. *International Review of Economics and Finance*, *78*(July 2021), 234–247. https://doi.org/10.1016/j.iref.2021.11.013

Goddard, J., Molyneux, P., & Wilson, J. O. S. (2004). The profitability of European banks: A cross-sectional and dynamic panel analysis. *Manchester School*, *72*(3), 363–381. https://doi.org/10.1111/j.1467-9957.2004.00397.x

Greenwald, D. L., Krainer, J., & Paul, P. (2020). FEDERAL RESERVE BANK OF SAN FRANCISCO The Credit Line Channel. *Federal Reserve Bank of San Francisco*.

Gugler, K., & Peev, E. (2018). The persistence of profits in banking : an international comparison. *Applied Economics*, *00*(00), 1–14. https://doi.org/10.1080/00036846.2018.1489111

Hansen, B. Y. B. E. (2011). Sample Splitting and Threshold Estimation Author (s): Bruce E . Hansen Published by : The Econometric Society Stable URL : http://www.jstor.org/stable/2999601 . Your use of the JSTOR archive indicates your acceptance of JSTOR ' s Terms and Conditions of. *Society*, *68*(3), 575–603.

Härle, P., Lüders, E., & Pepanides, T. (2010). Basel_III_and_European_banking_McKinsey. *McKinsey Company*, *26* (November).

Hoffmann, P. S. (2011). Determinants of the Profitability of the US Banking Industry *. *International Journal of Business and Social Science*, *2*(22), 255–269.

Hu, S., & Zhang, Y. (2021). COVID-19 pandemic and firm performance: Cross-country evidence. *International Review of Economics and Finance*, *74*(2020), 365–372. https://doi.org/10.1016/j.iref.2021.03.016

Huang, G. Y., Huang, H. H., & Lee, C. I. (2020). Taming the dark side of asset liquidity: The role of short-term debt. *International Review of Economics and Finance*, *69*(June), 539–562. https://doi.org/10.1016/j.iref.2020.06.007

IMF. (2020). *WORLD ECONOMIC WORLD ECONOMIC*.

Kabir Hassan, M., Khan, A., & Paltrinieri, A. (2018). Liquidity Risk, Credit Risk and Stability in Islamic and Conventional Banks. *Research in International Business and Finance*, *48*(November 2018), 17–31. https://doi.org/10.1016/j.ribaf.2018.10.006

King, M. R. (2013). The Basel III Net Stable Funding Ratio and bank net interest margins. *Journal of Banking and Finance*, *37*(11), 4144–4156. https://doi.org/10.1016/j.jbankfin.2013.07.017

Klein, N. (2013). Non-Performing Loans in CESEE: Determinants and Impact on Macroeconomic Performance. *IMF Working Papers*, *13*(72), 1. https://doi.org/10.5089/9781484318522.001

Köhler, M. (2014). Which banks are more risky? The impact of business models on bank stability Matthias. *Journal of Financial Stability*. https://doi.org/10.1016/j.jfs.2014.02.005

Le, M., Hoang, V. N., Wilson, C., & Managi, S. (2020). Net stable funding ratio and profit efficiency of commercial banks in the US. *Economic Analysis and Policy*, *67*, 55–66. https://doi.org/10.1016/j.eap.2020.05.008

Li, L., Strahan, P. E., & Zhang, S. (2020). Banks as lenders of first resort: Evidence from the COVID-19 crisis. *Review of Corporate Finance Studies*, *9*(3), 472–500. https://doi.org/10.1093/rcfs/cfaa009

Li, X., Feng, H., Zhao, S., & Carter, D. A. (2021). The effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic. *Finance Research Letters*, (January), 101957. https://doi.org/10.1016/j.frl.2021.101957

Mamun, A., Tannous, G., & Zhang, S. (2021). Do regulatory bank mergers improve operating performance? *International Review of Economics and Finance*, *73*(August 2020), 152–174. https://doi.org/10.1016/j.iref.2020.12.036

Mergaerts, F., & Vennet, R. Vander. (2016). Ac ce p te d t. *Journal of Financial Stability*. https://doi.org/10.1016/j.jfs.2015.12.002

Mpofu, T. R., & Nikolaidou, E. (2018). Determinants of credit risk in the banking system in Sub-Saharan Africa. *Review of Development Finance*, *8*(2), 141–153. https://doi.org/10.1016/j.rdf.2018.08.001

Neef, H. Ö. D., & Schandlbauer, A. (2021). COVID-19 and lending responses of European banks, (xxxx). https://doi.org/10.1016/j.jbankfin.2021.106236

Ozili, P. K. (2017). Bank Profitability and Capital Regulation : Evidence from Listed and non-Listed Banks in Africa Bank Pro fi tability and Capital Regulation : Evidence from. *Journal of African Business*, *00*(00), 1–26. https://doi.org/10.1080/15228916.2017.1247329

Pak, O. (2020). North American Journal of Economics and Finance Bank profitability in the Eurasian Economic Union : Do funding liquidity

and systemic importance matter ? *North American Journal of Economics and Finance*, *54*(July), 101265. https://doi.org/10.1016/j.najef.2020.101265

Pástor, Ľ., & Veronesi, P. (2013). Political uncertainty and risk premia. *Journal of Financial Economics*, *110*(3), 520–545. https://doi.org/10.1016/j.jfineco.2013.08.007

Petria, N., Capraru, B., & Ihnatov, I. (2015). Determinants of banks ' profitability : evidence from EU 27 banking systems. *Procedia Economics and Finance*, *20*(15), 518–524. https://doi.org/10.1016/S2212-5671(15)00104-5

Said, R. M. (2018). Basel III New Liquidity Framework and Malaysian Commercial Banks Profitability. *Jurnal Pengurusan*, *52*(52), 1–14. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=buh&AN=131737307&site=ehost-live

Seo, M. H., Kim, S., & Kim, Y. (2019). Estimation of Dynamic Panel Threshold Model, (2015), 1–12.

Tan, Y. (2016). The impacts of risk and competition on bank profitability in China. *Journal of International Financial Markets, Institutions and Money*, *40*, 85–110. https://doi.org/10.1016/j.intfin.2015.09.003

Wei, X., Gong, Y., & Wu, H. M. (2017). The impacts of Net Stable Funding Ratio requirement on Banks' choices of debt maturity. *Journal of Banking and Finance*, *82*, 229–243. https://doi.org/10.1016/j.jbankfin.2017.02.006

Yurttadur, M., Celiktas, E., & Celiktas, E. (2019). The Place of Non-performing Loans in the Turkish Banking Sector. *Procedia Computer Science*, *158*, 766–771. https://doi.org/10.1016/j.procs.2019.09.113

Çolak, G., & Öztekin, Ö. (2021). The impact of COVID-19 pandemic on bank lending around the world. *Journal of Banking and Finance*, *133*(July 2020), 106207. https://doi.org/10.1016/j.jbankfin.2021.106207

Received: Oct 05, 2023 Revised: Oct 08, 2023 Accepted: Oct 12, 2023