Bulletin of Monetary Economics and Banking, Vol. 23 No. 4, 2020, pp. 543 - 564
p-ISSN: 1410 8046, e-ISSN: 2460 9196

THE IMPACT OF NET STABLE FUNDING RATIO ON BANK PERFORMANCE AND RISK AROUND THE WORLD

Bowo Setiyono* and Ahmad Maulin Naufa**

*Corresponding author. Assistant Proffesor. Faculty of Economics and Business, Universitas Gadjah Mada, Indonesia. Email: bowo@ugm.ac.id
** Doctoral Student. Faculty of Economics and Business, Universitas Gadjah Mada, Indonesia and Lecturer. BINUS Business School Undergraduate Program, Bina Nusantara University, Indonesia. Email: ahmad.maulin@binus.ac.id

ABSTRACT

This study examines whether liquidity, as measured by net stable funding ratio (NSFR), impacts bank performance and risk. Based on an annual panel data set consisting of 2,909 banks from 127 countries, we find that NSFR reduces both performance and risk. These results are uniquely different in the robustness analysis under various settings (non-linear relationships, high versus low NSFR, and conventional versus Islamic banks). Overall, NSFR implementation brings benefits in the form of risk reduction rather than performance improvement to banks around the world.

Keywords: Net stable funding ratio; Liquidity; Risk; Bank; Performance.
JEL Classifications: B26; E52; E58; G21; G28.

Article history:
Received : October 10, 2019
Revised : August 30, 2020
Accepted : September 2, 2020
Available Online : December 31, 2020

https://doi.org/10.21098/bemp.v23i4.1166

I. INTRODUCTION

This research examines the impact of liquidity, measured by NSFR[1], on bank performance and risk. This is because, to date, the effect of liquidity on bank performance and risk is still unclear. Prior studies document either a positive or a negative effect of liquidity on bank performance and risk (Ashraf *et al*., 2016; Grundke & Kühn, 2019). Besides, understanding the impact of liquidity on bank performance and risk has become more important, given that global financial markets have become extremely volatile, especially under the COVID-19 pandemic.[2] Managing liquidity is critical to navigating turbulent times (see Phan *et al*., 2021). Bank liquidity is a crucial issue, since the banks will have a problem when they cannot fulfill depositors' withdrawal or make payment obligations. Frequent liquidity shortages eventually deplete depositors' trust in the ability of the banking system to maintain liquidity, especially during the crisis period (Hong *et al*., 2014; BCBS, 2018).

A strand of literature documents the inconclusive effect of liquidity on bank performance. In one view, it increases bank performance due to lower cost of capital (King, 2013), higher balance sheet growth (Grundke & Kühn, 2019), financial stability (Ashraf *et al*., 2016), and efficiency (Le *et al*., 2020). In the other view, too much liquid leads to inefficiency (Le *et al*., 2020), lowers lending rate (Acharya & Naqvi, 2012), net income (Grundke & Kühn, 2019), and lending growth (Naceur *et al*., 2018). Other studies like Dietrich *et al*. (2014) find no impact of liquidity on bank performance. The impact of liquidity on bank risk is also mixed. Firstly, it reduces risk because it lowers bank failures (Wei *et al*., 2017), systematic risk (Ly *et al*., 2017), distress risk (Bologna, 2013), default risk (Grundke & Kühn, 2019; King, 2013), and liquidity risk (Vazquez & Federico, 2015). Secondly, higher liquidity is related to higher bank risk due to creating higher bank instability, aggressive lending behavior (Acharya & Naqvi, 2012), and bank failure (Ghenimi *et al*., 2017; Wagner, 2007).

Theoretically, Diamond & Rajan (2001) argue that the fragility of bank deposits (funding liquidity) determines the ability to generate profits from borrowers. If bank funding is stable, the bank will be able to make more profitable investments. The public interest theory states that liquidity enhances profit efficiency, net interest margin, and profits (Barth *et al*., 2004, Le *et al*., 2020). Banks with higher NSFR get benefits from better predictability of cash out-and in-flow. On the contrary, Le *et al*. (2020) find that excessive liquidity could increase inefficiency. This is consistent with the trade-off hypothesis between new liquidity requirements and profitability (King, 2013). Excessive liquidity increases the resilience of banks during stressful

[1] Banks need to keep their liquidity to mitigate problems like liquidity crunch and bank runs in the future, for which the Basel III requires banks to maintain at least 100% for both NSFR (Bologna, 2013) and liquidity coverage ratio (LCR) (King, 2013). In this study, we focus on NSFR and we do not estimate LCR because the data required to calculate this ratio is not available. The objective of the LCR is to promote the short-term resilience of the liquidity risk profile of banks (BCBS, 2013).

[2] Several studies show that global economies and financial markets have become extremely volatile because of the COVID-19 pandemic (see e.g. Devpura, 2020; Devpura and Narayan, 2020; Iyke, 2020a, b, c; Iyke and Ho, 2020; Narayan, 2020a, b, c; Narayan, Devpura and Wang, 2020; Phan and Narayan, 2020; Sha and Sharma, 2020; Sharma and Sha, 2020; Sharma, 2020). Hence, learning ways to ensure safe and sound banking systems would go a long way to stabilize economies and financial markets.

periods but at the cost of lower profitability. Grundke & Kühn (2019) find that a higher proportion of high quality and liquid assets leads to decreasing net incomes and bank equity return.

With regards to risk, there are two competing theories. Firstly, the theory of timing liquidity argues that banks with the immediate trading equilibrium tend to adjust their NSFR quickly in response to the Basel III liquidity requirement, thereby reducing systemic risk (Bolton *et al*., 2011). Consistently, this leads to a lower probability of default and funding risks (Bologna *et al*., 2013; King, 2013). Secondly, the lending behavior perspective suggests that crises could emerge from flush liquidity, inducing bank managers to behave aggressively by mispricing the downside risk (Acharya & Naqvi, 2012). When a bank accepts more deposits, it will have a lower funding liquidity risk and shield itself from "run" risk that subsequently reduces market discipline and eventually encourages excessive risk-taking (Wagner, 2007).

We hypothesize that liquidity leads to lower bank performance since banks with high liquidity will lose profitable opportunities from loans (Acharya & Naqvi, 2012). Our second hypothesis is that liquidity reduces risk because it limits over-reliance on short-term yet unstable wholesale funding, hence lowering bank failures, systematic, and liquidity risk (Wei *et al*., 2017; Ly *et al*., 2017; Bologna, 2013).

Prior studies are insufficient for the following reasons. Firstly, most of the previous studies have not considered non-linear relationships (Le *et al*., 2020) between liquidity and performance or risk (Dietrich *et al*., 2014; Grundke & Kühn, 2019). Secondly, to best our knowledge, most recent studies[3] use datasets without considering the post-implementation period of NSFR (Basel III)[4]. Thirdly, previous studies use aggregate country-level data (e.g., King, 2013; Roulet, 2017). Fourthly, previous studies commonly focus on specific banks (i.e. either conventional or Islamic banks), such as Ashraf *et al*. (2016) for Islamic banks and Naceur *et al*. (2018) for conventional banks. In this study, we consider both Islamic and conventional banks as additional analysis and compare their results[5].

Our study provides some benefits especially for policymakers, market participants, and researchers. For policymakers, this study offers new insight into how NSFR should be optimally designed to address liquidity challenges while limiting its adverse impacts. It provides empirical evidence on liquidity impacts on Islamic and conventional banks for bank managers. For market participants, our study encourages the participants to exert more market discipline and monitoring roles. For researchers, this study enhances the NSFR literature by introducing

[3] Ashraf et al. (2016) consider a sample period of 2000-2013 period, while King (2013) considers only the 2009 period.

[4] The NSFR was introduced in October 2014 by BSCB (2014). Yet, its implementation has been in effective in January 2018 and mandatory for all banks in all countries.

[5] Islamic banks have different business models that possibly determine the impact of liquidity on performance or risk. They also must comply with regulations issued by both their respective banking authorities and Islamic boards (e.g., Islamic Financial Services Board, IFSB). They determine the adjustments of the assets and liability management, and the nature and behavior of Islamic banks. For example, while the traditional banks put more risk on borrowers, the Islamic bank system adopts risk/profit sharing between the bank and borrowers.

the role of non-linearity in the liquidity–performance/risk relationship and by broadening the context and coverage of bank types.

Our study is distinctive from previous works and offers some new insights. Firstly, we extend previous studies by accommodating non-linear relationships, as earlier discussed (Le *et al*., 2020; Ly *et al*., 2017). Secondly, since we do not know the NSFR's ultimate impact yet, our study provides more recent empirical evidence by including the post-implementation period[6]. Thirdly, we employ individual bank-level data to get better inferences, while controlling variabilities across countries or territories. Fourthly, we provide new empirical evidence based on the current mandatory liquidity proxy (NSFR), especially by distinguishing conventional and Islamic banks. Lastly, we offer evidence from 127 countries or territories, allowing us to get more extensive evidence and to control for the different levels of institutional developments across countries.

We uncover the following empirical findings. Firstly, our results indicate that liquidity leads to lower bank performance and risk. The Basel III accord about liquidity (NSFR) helps to reduce risk but it is associated with lower performance. Secondly, we capture the non-linear impact of liquidity on performance and risk. Thirdly, we observe, particularly, that higher liquidity in Islamic banks leads to higher risk in these banks, implying that the liquidity requirements should be adjusted differently for conventional and Islamic banks.

This study contributes to the literature in threefold. Firstly, it improves the empirical evidence on the impact of liquidity on performance and risk in 127 countries by considering a trade-off between performance and risk. Secondly, it emphasizes the identification of the optimum NSFR level, as the Basel committee only regulates its minimum (100%) because excessive liquidity has an adverse impact on the bank. Thirdly, it shows that conventional and Islamic banks have different characteristics, making their responses to liquidity adjustments different. Hence, the NSFR requirement should be adjusted on the basis of bank type.

The rest of the paper is organized as follows. The next section discusses the data and methodology. Section III provides the results and discussions. Lastly, Section IV draws the conclusions.

II. DATA AND METHODOLOGY

A. Data

To examine the impact of NSFR on bank performance and risk, we use data for 2,909 banks from 127 countries over the period 2007 to 2018. Our sample includes both bank-level and country-level data. The bank-level data are sourced from Osiris database, while the county-level data are sourced from the World Development Indicators database published by the World Bank. Osiris database provides information on banks' financial statements, including balance sheets, income statements, and non-financial data, such as ownerships and/or accounting standards. Specifically, we excerpt annual data from banks' balance sheets and income statements to calculate available stable funding (ASF) and required stable

[6] Among previous studies, Roulet (2017), for instance, focuses on testing the effect of liquidity (NSFR) on bank-lending growth in Europe.

Table 1.
Variable Description

This table provides the definition, sources, and references of each variable used in this research.

Variable	Definition	Source
	Panel A. Dependent variables	
ROA	The return on asset (in percent): is the ratio of net income divided by the total asset.	Osiris Database
ROE	The return on equity (in percent): is the ratio of net income divided by total equity.	Osiris Database
Tobin's Q	Tobin's Q ratio equals the market value of a company divided by the replacement value of the firm's asset	Osiris Database
SDROA	Asset risk: standard deviation of return on asset (ROA) yearly, based on last three-year ROA (t, t-1, t-2)	Osiris Database
SDROE	Equity risk: the standard deviation of return on equity (ROE) yearly, based on last three-year ROA (t, t-1, t-2)	Osiris Database
	Panel B. Independent bank-level variables	
NSFR	Net Stable Funding Ratio calculated using the following formula: $= \frac{(\text{Availble Stable Funding})}{(\text{Required Stable Funding})}$ $= \frac{\text{Equity} + \text{Liabs}_{>1\text{yr}} + (\text{StableDeposts}_{<1\text{yr}} . 90\%) + (\text{OtherDeposits} . 80\%) + (\text{StDebt} . 50\%)}{(\text{GovDebt}. 5\%) + (\text{CorpLoans}_{<1\text{yr}} . 50\%) + (\text{Mtgs}. 65\%) + (\text{RetLoans}_{<1\text{yr}} . 85\%) + (\text{Other} . 100\%)}$	Authors calculation. All required variables are sourced from Osiris Database
NSFR_Sq	The squared value of *NSFR*	Authors calculation.
NSFR_HL	A dummy variable which takes a value one when *NSFR* is higher than its median and zero otherwise.	Authors calculation.
A	The natural logarithm of total assets of the banks	Osiris Database
EA	The ratio of equity to total assets	Osiris Database
D	A dummy variable that takes a value one for listed banks and zero otherwise	Osiris Database
	Panel C. Independent country-level variable	
GDP	The growth rate of annual real GDP	World Development Index (WDI)

funding (RSF). The ASF and RSF are used to compute the NSFR ratio (see Table 1 and Appendix for detail information). More specifically, to compute the NSFR ratio, we simply follow King's (2013) approach.

We use three proxies of bank performance: (i) *Tobin's Q*, which is the market value of a bank divided by the replacement value of the bank's asset; (ii) return on assets (*ROA*), which is defined as net income divided by the total assets; and (iii) return on equity (*ROE*),which is defined as net income divided by the total equity. The choice of the proxies of bank performance is inspired by Bologna (2013) and Dietrich *et al*. (2014).

Additionally, we compute the standard deviation of return on asset (*SDROA*) and the standard deviation of return on equity (*SDROE*) and use these as proxies of bank risk (see Barry *et al*., 2011; Laeven & Levine, 2009; Lepetit *et al*., 2008; Naceur *et al*., 2018; Dietrich *et al*., 2014). Moreover, we use two bank-level control variables, namely asset of banks (*A*), which measures bank size (see also Phan *et al*., 2021), and the ratio of equity to asset (*EA*). Finally, we include a country-level control variable, namely the growth rate of gross domestic product (*GDP*). Our choice of control variables is dictated by prior literature (see Ashraf *et al*., 2016; Berger & Bouwman, 2013; Naceur *et al*., 2018; Khan *et al*., 2017; Rizvi *et al*., 2019; Ibrahim & Law, 2020; and Ly *et al*., 2017; Phan *et al*., 2021).

B. Methodology

We examine the impact of liquidity (*NSFR*) on bank performance using the following regression model:

$$BP_{i,t} = \alpha + \beta_1 NSFR_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{j,t} + \varepsilon_{i,t} \quad (1)$$

where $BP_{i,t}$ denotes performance of bank i and at year t. The bank performance is proxied by three variables, namely *ROA*, *ROE*, and *Tobin's Q*. $NSFR_{i,t}$ represents bank liquidity; $A_{i,t}$ represents total assets of bank in natural logarithm form; $EA_{i,t}$ denotes equity to the asset ratio; and $D_{i,t}$ represents a dummy variable that takes a value one for listed bank and (zero) otherwise. Listed banks are subject to stricter regulations (i.e., liquidity requirements) and market monitoring that, in turn, will determine their performance (see Liang *et al*., 2013). Finally, $GDP_{i,t}$ represents annual growth rate of real GDP country (of bank) j at time i. $\varepsilon_{i,t}$ is the residual of the model, while a and β_i are model parameters.

Additionally, we use two alternative measures for liquidity, namely *NSFR_HL* and *NSFR_Sq*. We use *NSFR_HL* instead of *NSFR* to distinguish the effect of high or low liquidity (*NSFR*) on bank performance. Therefore, *NSFR_HL* represents a dummy variable that takes the value of one if *NSFR* is higher than its median value and zero otherwise. *NSFR_Sq* represents squared value of *NSFR*, which determines the non-linear relationship between *NSFR* and bank performance. Thus, using these two alternative measures of liquidity (*NSFR_HL* and *NSFR_Sq*), we estimate the following two repression models:

$$BP_{i,t} = \alpha + \beta_1 NSFR\_HL_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$BP_{i,t} = \alpha + \beta_1 NSFR_{i,t} + \beta_2 NSFR\_Sq_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{i,t} + \varepsilon_{i,t} \quad (3)$$

Next, we also examine the effects of *NSFR*, *NSFR_HL* and *NSFR_Sq* on bank risk using the following regression model:

$$BR_{i,t} = \alpha + \beta_1 NSFR_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{i,t} + \varepsilon_{i,t} \quad (4)$$

$$BR_{i,t} = \alpha + \beta_1 NSFR\_HL_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{i,t} + \varepsilon_{i,t} \quad (5)$$

$$BR_{i,t} = \alpha + \beta_1 NSFR_{i,t} + \beta_2 NSFR\_Sq_{i,t} + \beta_2 A_{i,t} + \beta_3 EA_{i,t} + \beta_4 D_{i,t} + \beta_3 GDP_{i,t} + \varepsilon_{i,t} \quad (6)$$

Here, $BR_{i,t}$ denotes the risk of bank *i* at time *t*. We use two proxies of bank risk, namely *SDROA* and *SDROE*. The remaining variables are as defined earlier.

To estimate Equations (1)-(6), we use the generalized method of moments (GMM) estimation technique.[7] We use the dynamic GMM estimator in order to deal with potential endogeneity problem in our regression model (see Naceur *et al*., 2018). All bank-level variables are presumably endogenous, and therefore, it is necessary to have one-year lagged value as an instrument variable in the regression framework (see for instance, Dietrich *et al*., 2014; Ghenimi *et al*., 2017).

III. EMPIRICAL RESULTS

A. Preliminary results

We begin the empirical analysis by discussing selected descriptive statistics reported in Table 2. More specifically, we report the mean, median, minimum, maximum, standard deviation, and the percentile values of all variables used in this study. The mean value of NSFR is 0.82, which is very close to unity indicating that, on average, most of the banks achieved the minimum requirement (1.00) set by the Basel committee. With respect to the *NSFR_HL* statistics, we note that approximately 30% of the banks maintain high liquidity positions. The mean values of *SDROA* and *SDROE* are 1.39% and 7.82%, respectively. We also note that the SD of *SDROE* (26.28) is greater than the SD of *SDROA* (6.78).

[7] We have also used ordinary least squares (OLS) and fixed-effects estimators to conduct our empirical analysis. However, due to space constraint, we do not report these results in the paper. These results are available upon request from the corresponding author.

Table 2.
Descriptive Statistics

This table reports the descriptive statistics of all the variables used in this study. More specifically, we report the mean, standard deviation (SD), minimum (Min), 25 percentiles (P25), 50 percentiles (P50), 75 percentiles (P75), and maximum value (Max). All variables are defined in Table 1.

	NSFR	*NSFR_Sq*	*NSFR_HL*	*Tobin' s Q*	*ROA*	*ROE*
N	20,705	34,908	34,908	15,023	19,222	19,213
Mean	0.82	0.47	0.30	-2.23	1.18	6.13
SD	0.35	0.90	0.46	1.29	2.74	12.76
Min.	-2.05	0.00	0.00	-6.91	-16.27	-85.64
P25	0.63	0.00	0.00	-2.96	0.33	3.63
P50	0.85	0.16	0.00	-2.22	0.86	7.62
P75	1.05	0.84	1.00	-1.62	1.48	11.64
Max	9.60	92.08	1.00	6.19	12.69	41.71
	SDROA	*SDROE*	*A*	*EA*	*D*	*GDP*
N	18,378	18,373	23,945	13,729	34,908	34,015
Mean	1.39	7.82	54,400.00	31.46	0.58	2.30
SD	6.78	26.38	248,000.00	2,724.55	0.49	2.74
Min.	0.00	0.00	0.03	-94,867.66	0.00	-17.67
P25	0.10	0.90	510.00	0.01	0.00	1.55
P50	0.26	2.07	2,800.00	0.09	1.00	2.22
P75	0.83	5.29	17,000.00	0.87	1.00	2.88
Max	410.51	559.98	4,000,000.00	303,576.50	1.00	25.16

Table 3.
Correlation Coefficients

This table reports the correlation coefficients between all variables used in this study. All variables are defined in Table 1.

Variables	*NSFR*	*NSFR_Sq*	*NSFR_HL*	*Tobin's Q*	*ROA*	*ROE*	*SDROA*	*SDROE*	*A*	*EA*	*GDP*
NSFR	1.00										
NSFR_Sq	0.69	1.00									
NSFR_HL	0.76	0.54	1.00								
Tobin's Q	-0.29	-0.22	-0.14	1.00							
ROA	-0.22	-0.17	-0.13	0.38	1.00						
ROE	0.03	0.03	0.02	0.09	0.52	1.00					
SDROA	-0.18	-0.11	-0.10	0.09	-0.09	-0.20	1.00				
SDROE	-0.08	-0.02	-0.02	-0.12	-0.25	-0.34	0.46	1.00			
A	-0.10	-0.04	-0.11	-0.16	-0.04	0.05	-0.03	-0.01	1.00		
EA	-0.03	-0.01	-0.01	0.10	0.02	0.00	0.01	0.00	0.00	1.00	
GDP	-0.01	0.03	0.02	0.04	0.03	0.08	0.00	0.00	0.01	0.01	1.00

Next, we report the correlation coefficients between all variables considered in this study in Table 2. We note that *NSFR* is negatively correlated with two proxies of bank performance, namely *Tobin's Q* and *ROA*, and is positively correlated with *ROE*. With respect to bank risk variables, we find that *NSFR* is negatively correlated with *SDROA* and *SDROE*.

B. Main findings

The results based on the relationship between liquidity and bank performance are reported in Table 4. More specifically, the results based on the three liquidity proxies, namely *NSFR*, *NSFR_HL* and *NSFR_Sq* are reported in Panels A-C, respectively. We find that *NSFR* has a negative and statistically significant effect on two measures of bank performance, namely *Tobin's Q* and *ROA*. Our findings remain same when we use *NSFR_HL* and *NSFR_Sq* in the regression model. Additionally, we report that, irrespective of the liquidity measure used, the results related to *ROE* remain statistically insignificant. In other words, we do not find any significant evidence related to the relationship between *NSFR* and *ROE*.

Our findings with respect to Equation (3), which include both *NSFR* and *NSFR_Sq* as explanatory variables, is that the coefficient of *NSFR_Sq* is statically significant and positive, but the sign of the *NSFR* coefficient is negative. This means that the impact of liquidity on bank performance becomes weaker (less negative) once we consider non-linearity. Our results are consistent with Le *et al*. (2020), who document that the relationship between liquidity and bank performance is non-linear. In other words, our findings suggest that excessive liquidity has a minimal negative impact on bank performance.

Overall, our findings are consistent with prior studies, which document that an increase in liquidity leads to lower bank performance (see for instance, Le *et al*., 2020; Acharya & Naqvi, 2012; Grundke & Kühn, 2019; Naceur *et al*., 2018); in other words, this implies that more liquid banks are associated with lower profitability.

Table 4.
The Relationship Between Bank Liquidity and Bank Performance

In this table, we report the results obtained by estimating following three regression models: $BP_{i,t}=\alpha+\beta_1 NSFR_{i,t}+\beta_2 A_{i,t}+\beta_3 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{j,t}+\varepsilon_{i,t}$ (1); $BP_{i,t}=\alpha+\beta_1 NSFR\_HL_{i,t}+\beta_2 A_{i,t}+\beta_3 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{i,t}+\varepsilon_{i,t}$ (2); and $BP_{i,t}=\alpha+\beta_1 NSFR_{i,t}+\beta_2 NSFR\_Sq_{i,t}+\beta_2 A_{i,t}+\beta_5 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{i,t}+\varepsilon_{i,t}$ (3). The results based on Models 1 – 3 are reported in Panels A, B, and C, respectively. All variables are defined in Table 1. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

	Panel A. NSFR			Panel B. NSFR_HL			Panel C. NSFR_Sq		
Variables	***Tobin's Q***	***ROA***	***ROE***	***Tobin's Q***	***ROA***	***ROE***	***Tobin's Q***	***ROA***	***ROE***
NSFR	-25.75***	-28.15***	-0.35				-98.42***	-93.99***	-1.95
	(2.77)	(2.36)	(3.76)				(16.90)	(17.53)	(17.91)
NSFR_HL				-20.16***	-28.24***	14.81			
				(4.14)	(2.96)	(10.24)			
NSFR_Sq							55.68***	52.70***	1.35
							(9.61)	(10.12)	(10.30)
A	0.30***	0.05	0.82***	-0.22***	-0.42***	0.83***	0.89***	0.54***	0.84***
	(0.07)	(0.06)	(0.08)	(0.05)	(0.06)	(0.06)	(0.20)	(0.17)	(0.20)
EA	-0.00***	-0.00***	-0.00	-0.00***	-0.00***	0.00	-0.00*	-0.00***	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
D	-0.87***	-1.01***	0.52	-1.03***	-1.19***	1.37**	-0.35	-0.10	0.56*
	(0.23)	(0.24)	(0.37)	(0.36)	(0.39)	(0.62)	(0.24)	(0.20)	(0.31)
GDP	0.04	0.16***	0.25***	-0.03	0.22***	0.21**	0.06	0.12***	0.25***
	(0.04)	(0.04)	(0.08)	(0.06)	(0.07)	(0.09)	(0.05)	(0.04)	(0.08)
Constant	15.46***	24.41***	-5.36**	12.22***	21.53***	-13.58**	23.04***	30.11***	-5.35
	(1.67)	(1.63)	(2.41)	(2.37)	(1.83)	(5.45)	(3.69)	(4.18)	(3.94)
GMM C. Stat. Chi^2	492.15***	400.19***	0.46	129.33***	508.90***	0.26	3.86**	13.34***	0.36
Observations	6,454	7,625	7,016	6,454	7,932	8,553	4,578	6,489	7,016

When banks maintain their liquidity (*NSFR*), they reduce loans from unstable funds, thereby lowering lending, and, consequently, lowering profit. Higher liquidity decreases the lending rate (Acharya & Naqvi, 2012), lending growth (Naceur *et al*., 2018), and bank inefficiency (Le *et al*., 2020). We conclude that our findings are consistent with the trade-off hypothesis, which states that too much liquidity may have a detrimental effect on bank performance (see King, 2013).

Next, we read the results in Table 5. Here, we report the results obtained by estimating Equations (4) – (6), which examines the impact of bank liquidity on bank risk proxied by two variables, namely *SDROA* and *SDROE*. Our results based on the three measures of bank liquidity, namely *NSFR*, $NSFR_{LH}$, and *NSFR_Sq* are reported in Panels A, B, and C, respectively. Our findings suggest that the *NSFR* has a negative and statistically significant effect on bank risk. These findings are consistent with all three models as well as with the use of two risk variables (*SDROA* and *SDROE*). Our results support Wei *et al*. (2017), Ly *et al*. (2017), Bologna (2013), King (2013), and Vazquez and Federico (2015). Thus, we conclude that higher liquidity helps in reducing bank risk. Our findings are, once again, consistent with prior studies (see for example, King, 2013). Additionally, our findings are consistent with the argument that the higher the reliance on the less-stable components, the more likely a bank is to face distress (see for example Bologna, 2013; Grundke & Kühn, 2019).

Table 5.
The Relationship Between Bank Liquidity and Bank Risk

In this table, we report the results obtained by estimating the following three regression models: $BR_{i,t}=\alpha+\beta_1 NSFR_{i,t}+\beta_2 A_{i,t}+\beta_3 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{j,t}+\varepsilon_{i,t}$ (4); $BR_{i,t}=\alpha+\beta_1 NSFR\_HL_{i,t}+\beta_2 A_{i,t}+\beta_3 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{i,t}+\varepsilon_{i,t}$ (5); and $BR_{i,t}=\alpha+\beta_1 NSFR_{i,t}+\beta_2 NSFR\_Sq_{i,t}+\beta_2 A_{i,t}+\beta_3 EA_{i,t}+\beta_4 D_{i,t}+\beta_3 GDP_{i,t}+\varepsilon_{i,t}$ (6). Results based on Models 4 – 6 are reported in Panels A, B, and C, respectively. All variables are defined in Table 1. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

	Panel A. NSFR		**Panel B. NSFR_HL**		**Panel C. NSFR_Sq**	
Variables	***SDROA***	***SDROE***	***SDROA***	***SDROE***	***SDROA***	***SDROE***
NSFR	-32.27***	-33.20***			-57.14***	-78.85***
	(6.63)	(8.94)			(15.76)	(28.15)
NSFR_HL			-43.98***	-29.52***		
			(9.05)	(8.25)		
NSFR_Sq					31.02***	45.11***
					(8.97)	(16.16)
A	0.21*	0.51***	-0.34***	-0.09	0.44**	0.20
	(0.12)	(0.17)	(0.10)	(0.08)	(0.18)	(0.37)
EA	-0.00***	-0.00***	-0.00***	-0.00***	-0.00**	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
D	-1.17***	-1.13***	-1.91***	-1.46**	0.10	-1.22*
	(0.35)	(0.42)	(0.69)	(0.60)	(0.16)	(0.73)
GDP	0.15**	0.14**	0.27**	0.14	0.07*	-0.03
	(0.07)	(0.07)	(0.13)	(0.10)	(0.04)	(0.16)
Constant	24.99***	21.01***	27.65***	16.87***	17.02***	32.85***
	(4.05)	(5.31)	(4.65)	(4.28)	(3.45)	(5.95)
GMM C. Stat. Chi^2	3.60*	193.56***	3.90**	424.36***	4.39**	1.27
Observations	7,122	7,113	7,435	5,608	7,122	4,978

C. Additional results

Given our data sample contains both conventional and Islamic banks, it is wise to conduct the analysis by dividing these banks into groups. Therefore, in this section, we re-estimate all six equations by dividing banks into a panel of 66 Islamic and 2,843 conventional banks. This grouping is important because Islamic and conventional banks operates very differently and there is a literature, which explores a wide range of issues with respect to these two different groups of banks (see for instance, Narayan *et al*., 2018; Ibrahim & Law, 2020; Juhro *et al*., 2020). We begin by examining the impact of bank liquidity on Islamic and conventional banks' performance and report the results in Table 6. Our estimation approach is the same as explained earlier.

Our findings are twofold. Firstly, we document that our findings related to conventional banks remain same as the baseline. More specifically, we document that the *NSFR* has a negative and statistically significant effect on *Tobin' s Q* and *ROA* of the conventional banks, irrespective of model used, but we do not find any statistically significant evidence in the case of *ROA*. For the Islamic banks, however, we find weak evidence with respect to the relationship between liquidity and bank performance. We document that the *NSFR* has a negative and statistically significant effect on only one proxy of Islamic bank performance, namely *Tobin' s Q*, but *ROA* and *ROE*.

Table 6.
The Relationship Between Liquidity and Performance of Conventional and Islamic Banks

In this table, we report the results for the Islamic and conventional banks. Our estimation approach remains the same as the baseline in Table 4. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

	Panel A. NSFR to Performance						Panel B. NSFR_HL to Performance					
Variables	**Conventional Banks**			**Islamic Banks**			**Conventional Banks**			**Islamic Banks**		
	Tobin's Q	*ROA*	*ROE*	*Tobin's Q*	*ROA*	*ROE*	*Tobin's Q*	*ROA*	*ROE*	*Tobin's Q*	*ROA*	*ROE*
NSFR	-25.76***	-26.00***	0.29	-13.24**	0.93	-70.71						
	(3.41)	(2.31)	(4.05)	(5.62)	(1.33)	(72.48)						
NSFR_HL							-19.92***	-22.96***	16.99	-2.47**	-0.10	-96.73
							(4.03)	(2.43)	(11.39)	(1.04)	(1.78)	(112.90)
A	0.28***	0.01	0.80***	0.84***	0.34***	5.87	-0.23***	-0.43***	0.83***	0.08	0.50***	7.87
	(0.08)	(0.06)	(0.09)	(0.28)	(0.10)	(4.29)	(0.05)	(0.05)	(0.07)	(0.09)	(0.12)	(6.81)
EA	-0.00***	-0.00***	-0.00	-0.15	0.02***	0.51	-0.00***	-0.00***	0.00	0.09*	0.04*	1.12
	(0.00)	(0.00)	(0.00)	(0.23)	(0.01)	(0.45)	(0.00)	(0.00)	(0.00)	(0.05)	(0.02)	(1.13)
D	-0.95***	-0.96***	0.58	-0.26	-0.45***	1.09	-1.05***	-1.07***	1.57**	0.27	-0.46**	2.51
	(0.27)	(0.25)	(0.38)	(0.53)	(0.11)	(3.17)	(0.36)	(0.35)	(0.71)	(0.28)	(0.19)	(8.67)
GDP	0.05	0.17***	0.29***	-0.03	-0.03	0.21	-0.02	0.18**	0.23**	-0.07	-0.05	0.46
	(0.05)	(0.05)	(0.08)	(0.06)	(0.02)	(0.90)	(0.06)	(0.07)	(0.10)	(0.05)	(0.04)	(1.69)
Constant	15.67***	23.19***	-5.71**	-4.30	-4.70***	-26.76	12.21***	19.33***	-14.78**	-2.20	-6.29***	-70.41
	(2.03)	(1.59)	(2.60)	(2.94)	(1.01)	(18.89)	(2.32)	(1.57)	(6.15)	(1.40)	(1.31)	(60.69)
GMM C. Stat. Chi^2	159.00**	219.22***	0.38	6.31**	3.94**	0.93	128.79***	312.69***	0.33	4.80**	0.01	1.25
Observations	5,292	6,277	6,796	206	178	252	6,248	6,438	8,285	206	268	256

Table 6.
The Relationship Between Liquidity and Performance of Conventional and Islamic Banks (Continued)

	Panel C. NSFR_Sq to Performance					
Variables	**Conventional Banks**			**Islamic Banks**		
	Tobin's Q	***ROA***	***ROE***	***Tobin's Q***	***ROA***	***ROE***
NSFR	-59.44***	-27.86***	-6.29	-55.61***	-2.66	3.80
	(13.27)	(6.24)	(7.32)	(16.85)	(4.52)	(22.07)
NSFR_Sq	33.54***	15.09***	4.16	36.77***	2.19	-0.88
	(7.53)	(3.60)	(4.24)	(10.73)	(2.92)	(14.09)
A	0.43***	-0.04	0.84***	1.17***	0.42***	1.33**
	(0.15)	(0.06)	(0.10)	(0.24)	(0.13)	(0.63)
EA	-0.00	-0.00	-0.00	-0.86***	0.02***	0.11***
	(0.00)	(0.00)	(0.00)	(0.27)	(0.00)	(0.03)
D	-0.18	0.03	0.81**	-1.63***	-0.60***	-3.48***
	(0.17)	(0.09)	(0.32)	(0.51)	(0.16)	(0.95)
GDP	0.01	0.01	-0.06	0.15	-0.03	-0.12
	(0.03)	(0.02)	(0.07)	(0.09)	(0.02)	(0.19)
Constant	14.78***	13.27***	-3.08*	-0.32	-4.38***	-9.99**
	(3.06)	(1.56)	(1.84)	(4.83)	(1.27)	(4.42)
GMM C. Stat. Chi^2	2.27	302.67***	21.83***	5.04**	1.29	0.00
Observations	4,007	5,301	5,759	206	178	178

Table 7.
The Impact of NSFR, NSFR_HL, and NSFR_Sq on Risk: Conventional vs. Islamic Banks

In this table, we report the results for the Islamic and conventional banks. Our estimation approach remains the same as the baseline in Table 5. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively.

	Panel A. NSFR to Risk				Panel B. NSFR_HL to Risk				Panel C. NSFR_Sq to Risk			
Variables	**Conventional Banks**		**Islamic Banks**		**Conventional Banks**		**Islamic Banks**		**Conventional Banks**		**Islamic Banks**	
	SDROA	*SDROE*	*SDROA*	*SDROE*	*SDROA*	*SDROE*	*SDROA*	*SDROE*	*SDROA*	*SDROE*	*SDROA*	*SDROE*
NSFR	-60.69***	-39.50***	38.93***	79.49*					-59.38***	-79.08***	-17.41	-47.01
	(16.12)	(14.12)	(13.77)	(44.58)					(16.68)	(29.34)	(22.44)	(44.84)
NSFR_HL					-43.48***	-16.74*	26.02*	59.69*				
					(8.95)	(9.17)	(15.48)	(35.58)				
NSFR_Sq									32.30***	45.19***	10.36	28.11
									(9.51)	(16.82)	(13.68)	(27.28)
A	0.72**	-0.03	-2.32**	-4.94*	-0.37***	-0.77***	-1.81	-4.46	0.45**	0.19	0.22	0.39
	(0.30)	(0.27)	(0.95)	(2.81)	(0.10)	(0.13)	(1.10)	(2.73)	(0.19)	(0.38)	(0.45)	(1.01)
EA	-0.00***	-0.00**	-0.25**	-0.49	-0.00***	-0.00	-0.26	-0.61	-0.00**	-0.00	0.01	0.02
	(0.00)	(0.00)	(0.10)	(0.30)	(0.00)	(0.00)	(0.16)	(0.37)	(0.00)	(0.00)	(0.03)	(0.07)
D	-2.26***	-2.85***	-0.35	-0.51	-2.04***	-2.43***	-0.97	-2.17	0.09	-1.22	-0.09	-0.69
	(0.77)	(0.97)	(1.41)	(3.08)	(0.70)	(0.91)	(2.29)	(5.36)	(0.17)	(0.74)	(0.34)	(1.07)
GDP	0.31**	0.07	-0.45*	-0.48	0.25*	-0.14	-0.31	-0.46	0.06	-0.06	0.12	0.66*
	(0.13)	(0.18)	(0.24)	(0.67)	(0.13)	(0.15)	(0.40)	(0.96)	(0.04)	(0.17)	(0.16)	(0.35)
Constant	41.48***	39.65***	6.47	16.87	27.87***	26.64***	17.15	45.58	17.73***	33.22***	3.35	13.52**
	(9.50)	(8.69)	(9.10)	(19.07)	(4.69)	(5.68)	(11.98)	(30.39)	(3.70)	(6.24)	(2.24)	(6.40)
GMM C. Stat. Chi^2	1.22	0.66	0.02	4.02**	3.97**	0.31	0.78	9.64***	4.52**	1.15	0.42	1.16
Observations	7,388	4,828	230	230	7,201	4,879	234	234	6,892	4,828	239	239

Finally, we examine the impact of bank liquidity on Islamic and conventional bank risk and report in Table 7. Our findings with respect to conventional banks is same as the baseline (i.e. the estimates using all 2,909 banks). More specifically, we report that the *NSFR* has a negative and statistically significant effect conventional bank risk. However, we cannot say same about Islamic banks. Our findings with respect to Islamic banks is mixed. For instance, in regression models where we use *NSFR* (refer to Equation 4) and *NSFR_HL* (refer to Equation 5) as proxies for bank liquidity, we find that bank liquidity has a positive and statistically significant effect on Islamic bank risk. This evidence is consistent with Ashraf *et al*. (2016), who document that, while seeking higher profits, Islamic banks engage in high risk-taking behavior. The asset and liability of Islamic banks are structured to be more equity-based contracts and they are more eager to take a high risk to pursue higher profitability. There is a risk-return trade-off experienced by Islamic banks. Ashraf *et al*. (2016) further documents that Islamic banks are more unstable than their counterparts. Islamic banks are subject to stricter regulations compared to conventional banks. Hence, our findings highlight the notion that Islamic banks face different circumstances, including how they manage liquidity as well as its ultimate impact on their performance and risk.

IV. CONCLUSION

This study investigates the impact of liquidity on bank performance and bank risk. We use data for 2,909 banks from 127 countries. We draw the following conclusions from our empirical analysis. Firstly, we document that bank liquidity has a negative effect on bank performance and as well as on bank risk. Secondly, we unveil that the effect of bank liquidity varies across Islamic and conventional banks. Our findings with respect to conventional banks remain unchanged; we document a negative relationship between bank liquidity and bank performance and bank risk. However, in the case of Islamic banks, we document a weak evidence in favour of the relationship between bank liquidity and Islamic banks performance and bank risk. Finally, we conclude that our findings are mostly consistent using different proxies of bank performance and bank risk.

REFERENCES

Acharya, V., & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of Financial Economics*, 106, 349–366. https://doi.org/10.1016/j.jfineco.2012.05.014

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

Barry, T. A., Lepetit, L., & Tarazi, A. (2011). Ownership structure and risk in publicly held and privately owned banks. *Journal of Banking and Finance*, 35, 1327–1340. https://doi.org/10.1016/j.jbankfin.2010.10.004

Barth, J. R., Jr, C. G., & Levine, R. (2004). Bank regulation and supervision: what works best? *Journal of Financial Intermedation*, 13, 205–248. https://doi.org/10.1016/j.jfi.2003.06.002

Basel Committee on Banking Supervision (BCBS). (2013). *Basel III: The liquidity coverage ratio and liquidity risk monitoring tools.* Bank for International Settlements. https://www.bis.org/publ/bcbs238.htm

Basel Committee on Banking Supervision (BCBS). (2018). *Basel Committee on Banking Supervision: Fifteenth progress report on adoption of the Basel regulatory framework.* Bank for International Settlements. https://www.bis.org/bcbs/publ/d452.htm

Berger, A. N., & Bouwman, C. H. S. (2013). How does capital affect bank performance during financial crises ? *Journal of Financial Economics*, 1–31. https://doi.org/10.1016/j.jfineco.2013.02.008

Bologna, P. (2013). Structural Funding and Bank Failures: Does Basel 3 Net Stable Funding Ratio Target the Right Problem? *Journal of Financial Services Research*, 47, 81–113. https://doi.org/10.1007/s10693-013-0180-4

Bolton, P., Santos, T., & Scheinkman, J. A. (2011). Outside and inside liquidity. *Quarterly Journal of Economics*, 126, 259–321. https://doi.org/10.1093/qje/qjq007

Devpura, N. (2020). Can Oil Prices Predict Japanese Yen? *Asian Economics Letters*, 1. https://doi.org/10.46557/001c.17964

Devpura, N., & Narayan, P.K., (2020) Hourly Oil Price Volatility: The Role of COVID-19. *Energy Research Letters*, 1, 13683. https://doi.org/10.46557/001c.13683

Diamond, D. W., & Rajan, R. G. (2001). Liquidity Risk, Liquidity Creation, and Financial Fragility: A Theory of Banking. *Journal of Political Economy*, 109, 287–327. https://doi.org/10.1086/319552

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, 13–25. https://doi.org/10.1016/j.jbankfin.2014.03.041

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2017). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. *Borsa Istanbul Review*, 17, 238–248. https://doi.org/10.1016/j.bir.2017.05.002

Grundke, P., & Kühn, A. (2019). The impact of the Basel III liquidity ratios on banks: Evidence from a simulation study. *Quarterly Review of Economics and Finance*. https://doi.org/10.1016/j.qref.2019.02.005

Hong, H., Huang, J. Z., & Wu, D. (2014). The information content of Basel III liquidity risk measures. *Journal of Financial Stability*, 15, 91–111. https://doi.org/10.1016/j.jfs.2014.09.003

Ibrahim, M. H., & Law, S. H. (2020). Financial intermediation costs in a dual banking system: The role of islamic banking. *Buletin Ekonomi Moneter Dan Perbankan*, 22, 529–550. https://doi.org/10.21098/bemp.v22i4.1236

Iyke, B. (2020a). COVID-19: The Reaction of US Oil and Gas Producers to the Pandemic. *Energy Research Letters*, 1, 13912. https://doi.org/10.46557/001c.13912

Iyke, B.N. (2020b). The Disease Outbreak Channel of Exchange Rate Return Predictability: Evidence from COVID-19. *Emerging Markets Finance and Trade*, 56, 2277-2297. https://doi.org/10.1080/1540496X.2020.1784718.

Iyke, B. N. (2020c). Economic Policy Uncertainty in Times of COVID-19 Pandemic. *Asian Economics Letters*, 1. https://doi.org/10.46557/001c.17665

Iyke, B. N. & Ho, S.-Y. (2020). Investor attention on COVID-19 and African stock returns. *MethodsX*. https://doi.org/10.1016/j.mex.2020.101195

Juhro, S. M., Narayan, P. K., Iyke, B. N., & Trisnanto, B. (2020). Is there a role for Islamic finance and R&D in endogenous growth models in the case of Indonesia?. *Pacific-Basin Finance Journal*, 62, 101297. https://doi.org/10.1016/j.pacfin.2020.101297

Khan, S. M., Scheule, H., & Wu, E. (2017). Funding liquidity and bank risk taking. *Journal of Banking and Finance*, 82, 203–216. https://doi.org/10.1016/j.jbankfin.2016.09.005

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

Laeven, L., & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, 93, 259–275. https://doi.org/10.1016/j.jfineco.2008.09.003

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

Lepetit, L., Nys, E., Rous, P., & Tarazi, A. (2008). Bank income structure and risk : An empirical analysis of European banks. *Journal of Banking and Finance*, 32, 1452–1467. https://doi.org/10.1016/j.jbankfin.2007.12.002

Liang, Q., Xu, P., & Jiraporn, P. (2013). Board characteristics and Chinese bank performance. *Journal of Banking and Finance*, 37, 2953–2968. https://doi.org/10.1016/j.jbankfin.2013.04.018

Ly, K. C., Chen, Z., Wang, S., & Jiang, Y. (2017). The Basel III net stable funding ratio adjustment speed and systemic risk. *Research in International Business and Finance*, *39*, 169–182. https://doi.org/10.1016/j.ribaf.2016.07.031

Naceur, B. S., Marton, K., & Roulet, C. (2018). Basel III and bank-lending: Evidence from the United States and Europe. *Journal of Financial Stability*, 39, 1–27. https://doi.org/10.1016/j.jfs.2018.08.002

Narayan, P. K. (2020a). Oil price news and COVID-19—Is there any connection?. *Energy Research Letters*, 1, 13176. https://doi.org/10.46557/001c.13176

Narayan, P. K. (2020b). Has COVID-19 Changed Exchange Rate Resistance to Shocks? *Asian Economics Letters*, 1. https://doi.org/10.46557/001c.17389

Narayan, P. K. (2020c). Did Bubble Activity Intensify During COVID-19? *Asian Economics Letters*, 1. https://doi.org/10.46557/001c.17654

Narayan, P.K., Devpura, N., & Wang, H. (2020). Japanese currency and stock market—What happened during the COVID-19 pandemic? *Economic Analysis and Policy*, 68, 191-198.

Narayan, P.K., Sharma, P.K., Thuraisamy, K.S., & Westerlund, J. (2018). Some Preliminary Evidence of Price Discovery in Islamic Banks. *Pacific-Basin Finance Journal*, 52, 107-122. https://doi.org/10.1016/j.pacfin.2017.12.007

Phan, D. H. B., Iyke, B. N., Sharma, S. S., & Affandi, Y. (2021). Economic policy uncertainty and financial stability–Is there a relation?. *Economic Modelling*, 94, 1018-1029. https://doi.org/10.1016/j.econmod.2020.02.042

Phan, D.H.B., & Narayan, P.K. (2020). Country responses and the reaction of the stock market to COVID-19—a Preliminary Exposition. *Emerging Markets Finance and Trade*, 56, 2138-2150. https://doi.org/10.1080/1540496X.2020.1784719

Rizvi, S. A. R., Narayan, P. K., Sakti, A., & Syarifuddin, F. (2019). Role of Islamic banks in Indonesian banking industry: an empirical exploration. *Pacific Basin Finance Journal*, 62, 1–10. https://doi.org/10.1016/j.pacfin.2019.02.002

Roulet, C. (2017). Basel III: Effects of Capital and Liquidity regulations on European Bank Lending. *Journal of Economics and Business*. https://doi.org/10.1016/j.jeconbus.2017.10.001

Sha, Y., & Sharma, S. S. (2020). Research on pandemics special issue of the journal Emerging Markets Finance and Trade (2020): 2133-2137.

Sharma, S.S., & Sha, Y. (2020) Part A: Special Section on COVID-19 Research. *Emerging Markets Finance and Trade,* 56, 3551-3553. https://doi.org/10.1080/1540496X.2020.1858617

Sharma, S. S. (2020). A Note on the Asian Market Volatility During the COVID-19 Pandemic. *Asian Economics Letters*, 1. https://doi.org/10.46557/001c.17661

Vazquez, F., & Federico, P. (2015). Bank funding structures and risk: Evidence from the global financial crisis. *Journal of Banking and Finance*, 61, 1–14. https://doi.org/10.1016/j.jbankfin.2015.08.023

Wagner, W. (2007). The liquidity of bank assets and banking stability. *Journal of Banking and Finance*, 31, 121–139. https://doi.org/10.1016/j.jbankfin.2005.07.019

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

Appendix A. Net Stable Funding Ratio and Its Components

The table shows net stable funding ratio and its components. The table is adapted from King (2013).

Required Stable Funding (RSF)	**RSF Weight**
Gross loans	
Net loans	
Residential mortgage loans	0.85
Other mortgage loans	0.85
Other consumer/retail loans	0.85
Corporate & Commercial loans	0.85
Other loans	0.85
Memo: Mandatory reserves included above	1.00
Loans and advances to banks	0.00
Total securities	
Reserves repos and cash collateral	
Plus: trading securities and at FV through income	
Plus: derivatives	
Plus: available for sale securities	
Plus: Held to maturity securities	
Plus: other securities	
Memo government securities included above (level 1)	0.05
Total securities (level 2)	0.50
At-equity investment in associates	1.00
Other earning assets	1.00
Cash and due from banks	0.00
Total assets (non-interest earning asset)	1.00
Less: total earning asset	
Off-balance sheet	0.05
Available Stable Funding (ASF)	**ASF Weight**
Customer deposits	
Customer deposits-current	0.90
Customer deposits-savings	0.95
Customer deposits-term	0.95
Deposits from banks	0.00
Wholesale short-term borrowing	
One month – 6 months	0.00
Six months – 12 months	0.50
Long-term borrowing	1.00
Derivatives liabilities	0.00
Trading liabilities	0.00
Other liabilities (tax, pension, insurance)	0.00
Equity	1.00

This page is intentionally left blank