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BANK SIZE AND FINANCIAL PERFORMANCE IN SUB-SAHARAN AFRICA: A DYNAMIC PANEL APPROACH

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ABSTRACT

Bank size is one of the vital internal determinants of banking performance, although scholars hold contradictory views on bank size and its influence on performance. The aim is to examine the effect of bank size on quoted deposit money banks (DMBs) in the region of sub-Saharan Africa (SSA). The sample, collected over a period of nine years (2011-2019) included fifty listed commercial banks drawn from across the six sub-Saharan African countries, namely Nigeria, Ghana, South Africa, Zambia, Kenya, and Tanzania. The data were analyzed using a two-step system generalized method of moment (GMM). The finding revealed a significant and negative association between bank size and its financial performance. However, the smaller banks performed better when compared to their larger counterparts in the region. These findings seem to suggest that banks keep their capital

level on the high side and minimize the rate of their non-performing loans in order to achieve more excellent banking performance within the region.

Keywords: Bank size, bank performance, capital adequacy ratio, system GMM, SSA.

INTRODUCTION

Bank performance is affected by both external and internal factors (Sufian, 2012). The internal determinants constitute individual bank attributes that have been shown to affect the performance of banks. Many studies examined the association of bank performance with firm-specific features (Terraza, 2015). The relationship between bank size and performance has been widely researched, particularly in developed and emerging economies, though with less attention given to the sub-Saharan African (SSA) region. Economic theorists opined that market structure would affect bank performance, since larger institutions could offer lower-cost services until diseconomies of scale set in (Luc & Levine, 2009). Many studies have indicated that the association between bank size and performance can be positive, for example as highlighted in studies by Athanasoglou et al. (2006) and Dietrich and Wanzenried (2011), or negative as found in the studies by Luo et al. (2016), Naceur and Omran (2011) and Waemustafa and Sukri (2015).

The recent global financial crisis lasting from 2007 to 2009 was attributed mainly to larger banks, and their distress affected the real economy. As a result, a robust debate was triggered on organizational complexity, optimal size, and the whole spectrum of banking activities (Laeven et al., 2014). These deliberations took place against the background of a financial setting that has emerged significantly in the past two decades, supported by financial deregulation and innovation. The rapid acceleration of growth in the size of the banking system and increasing global interconnection led larger banks to increase their complexity, size, and involvement in market-based activities. Consequently, opinions on the optimal way forward vary. Some prefer capital review on larger banks, as in Basel III provisions, while others are against it.

Previous studies have focused on the experience of bank size in advanced economies; a smaller number of studies have examined the pattern of behaviour of bank size and how it affected its performance in the context of the SSA, and therefore this study is expected to fill the literature gap. Also, it analyzed the impact of bank size on the performance of the SSA banks and this has contributed to the literature in several ways. Firstly, the study examined the behaviour pattern of the banks in terms of size and how this could affect the financial performance of banks in the SSA. Secondly, the study used the new data set from banks in the SSA, data which were collected from the latest recent period in the banking history of the SSA banks. Thirdly, the present study is among the first studies to carry our research on the major financial markets in the SSA region, and this could be an important point of departure for future researchers.

The remainder of the paper is sectionally structured as follows: Section 2 discusses the concept and relevant empirical studies related to the subject matter, Section 3 discusses the data and methodology adopted, while Section 4 describes the results, and finally, Section 5 provides the conclusion and recommendation.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The bank handles expected economies and diseconomies of scale within the banking industry. It monitors product and cost differences and risk diversification concerning financial institution size (Sufian & Chong, 2008). The consensus in the general literature has been that the banking mean cost curve is relative to optimal bank size, with a flat U shape being a bit more efficient than small or large banks. On the other hand, length could be nonlinear, with performance increase in the initial period and the size and then diminishing for bureaucratic and many other reasons (Athanasoglou et al., 2006).

Moreover, a larger bank will have economies of scale, which is the result of joint and similar service provisions. Barros et al. (2012) found that more diversified and larger banks had higher poor performance probability, signifying that specialized and smaller banks could minimize asymmetric information and be more efficient in lending. The critical issue to address based on the literature, is whether bank

profitability is affected by size. Past studies have examined the relationship between the two factors, and empirical research evidence proved the function of height in influencing bank profitability determinants.

Extensive empirical studies have revealed the following findings. Studies by Smirlock (2013), and Bikker and Bos (2014) showed a significant positive association between the size and profitability of banks. Moreover, Athanasoglou et al. (2006) and Kosmidou et al. (2007) found a positive association between profitability and the size of banks they investigated. Past researches on the association of size and profitability of banks showed that economies of scale could benefit a large number of banks, enabling cost minimization (Bourke, 1989; Goddard et al., 2004; Molyneux & Thornton, 1992), and a higher rate of production expected to be recorded compared to smaller banks.

On the other hand, some scholars have found a negative relationship between bank size and profitability, indicating that larger banks obtained lesser profit than smaller ones due to the better management of their capital and a lower rate of non-performing loans contained by their capital coverage. These were findings as reported by Jiang et al. (2003) and Sufian and Chong (2008). Naceur and Goaied (2001) opined that size had a significant and negative effect, mainly on net interest margins. Kosmidou et al. (2007) and Dietrich and Wanzenried (2011), in their findings on the performance of banks, revealed that the inverse association witnessed in large banks was due to heavy losses triggered by many irrecoverable loans. Moreover, Boyd and Runkle (1993) confirmed a negative association between profitability and size. In another study, Hassan Al-Tamimi and Charif (2011) examined the various approaches of performance evaluation by the U.A.E commercial banks and found that large banks perform better than small banks.

Similarly, the available literature in this area has shown that the relationship between bank size and performance can be positive or negative (Athanasoglou et al., 2006; Naceur & Omran, 2011). Studies that revealed a positive relationship between bank size and performance included the work of Le et al. (2020) and Sakawa et al. (2020). Other studies have established a negative association between bank size and performance, such as the work of Dávila and Walther (2020), Lorenc and Zhang (2020) and Noman et al. (2021).

Joaqui-Barandica et al. (2021) examined the relationship between commonality, macroeconomic factors and bank profitability, while the study by Chand et al. (2021) analysed the determinant of bank stability in a small Island economy, providing evidence from Fiji.

Moreover, the study by Rahmi and Sari (2019) investigated the relationship between risk-based bank ratio and profitability of Sharia banking. Saleh and Abu Afifa (2020) investigated the relationship between credit risk, liquidity risk, bank capital and bank profitability among emerging economies. Abdelaziz et al. (2020) analyzed the association between credit risk, liquidity risk and bank performance within the Middle East and North African (MENA) region. Karyani et al. (2020) examined the relationship between risk governance and bank profitability in ASEAN-5. Hence, most of the studies on the performance of banks have focused on its determinants, or testing the influence of other factors on bank performance. Therefore, the focus of this study is on bank size effect on bank performance in the SSA.

Biswas et al. (2017) examined the effect of bank size on firm value among borrowers in the United States (U.S.). The findings revealed a positive association between bank size and substantial weight following loan origination. Grechyna (2018) evaluated the relationship between firm size, bank size, and financial development, and discovered a negative association between characteristics of bank size and economic growth. In contrast, De Haan and Poghosyan (2012) analyzed the nexus between the measure of bank and earnings volatility of U.S. Bank Holding Companies, and they found a positive association between size and earnings of U.S. Banks. Le et al. (2020) evaluated the relationship between bank size and efficiency in a developing economy. The result indicated that small banks were more efficient compared to large banks. These previous studies with their different findings have led to the formulation of the following two hypotheses. Larger banks, by principle, are expected to experience a more significant rise in performance through economies of scale. Conversely, above a particular size threshold, diseconomies of scale could emerge, rendering the bank size an obstacle to its implementation. To guide the present study, the following hypotheses, which have been developed based on previous empirical studies, were proposed:

H_1: There is a significant positive relationship between bank size and bank performance in the SSA.

The non-performing loan (NPL) size is an indication of banking performance; that is, the lower, the better (Beck et al., 2015). NPLs are widely accepted among scholars as a great impediment and a contributing factor to bank failures. Holding a higher proportion of NPLs is an indication of a poor-performing bank and vice versa. Most empirical studies have established a negative association between NPLs and bank performance. Barros et al. (2012) in their study reported a negative relationship between bank performance and NPL ratios.

Given the many negative effects of the NPL, most banks have incorporated low NPL ratios as part of their performance objectives (Vanhoose, 2007). Other empirical studies, such as those by Ghosh et al. (2020); Killins et al. (2020); Li et al. (2021); Mahrous et al. (2020) and Ozili (2020) have established a negative relationship between the NPL and bank performance. Knowing the extent of the influence of the NPL on other factors influencing bank performance will help greatly in management decision on how to contain its effect on the banking sector. Based on this, the following hypothesis was formulated:

H_2: There is a significant relationship between non-performing loans and bank performance in the SSA.

METHODOLOGY AND DATA

Theoretical Framework

The agency theory posited and established firm-specific characteristics relevant to firm performance. The main idea behind agency theory (Jensen & Meckling, 1976) is that the principal and the firm's agent have a mismatched objective, with the latter believed to administer the firm's affairs based on his interest, and at the expense of his principal. In other words, the theory provides that actions and decisions of agents are skewed primarily towards personal gains. Hence, managerial empire building influences the prospect of increasing firm size, and large firms usually have lousy governance. It further explains that an agent, serving as managers in banks may increase the size of their banks to enjoy personal benefit due to managing a large organization, or receiving higher compensation due to the size of the bank (Gabaix & Landier, 2008; Jensen, 1986; Murphy, 1985). By extension, this theory predicts a negative association between bank size and performance.

The proponents of a large board size believe that it provides an increased pool of expertise because larger boards are likely to have more knowledge and skills at their disposal. They can also reduce the dominance of an overbearing C.E.O. (Forbes & Milliken, 1999). The board's monitoring and supervising capacity increases as more and more directors join the board (Jensen, 1993). These proponents also find support from stakeholder theory which suggests a positive association between larger boards and effective decision making. Furthermore, a larger board size may enhance the quality of advice given to corporate management (Forbes & Milliken, 1999; Cohen et al., 2002; Haniffa & Hudaib, 2006).

Model

This study uses dynamic model specifications to appraise the effects of bank size and financial performance. The empirical models for assessing the impact of bank size and financial performance are specified in Equation (1) and Equation (2). The dependent variable is financial performance, which is proxied by return on asset (*ROA*) and return on equity (*ROE*). The leading independent variables are bank size that is proxied by a log of total investment, bank-specific and represented by capital adequacy ratio (*CAR*), deposit ratio (*DEP*), loan ratio (*LON*), and non-performing loan (*NPL*). In addition, macroeconomic variables included in the model are gross domestic product (*GDP)* and inflation (*INF*).

$$ROA_{ijt} = \beta_0 + \beta_1 ROA_{ijt-1} + \beta_2 BSZ_{ijt} + \beta_3 CAR_{ijt} + \beta_4 NPL_{ijt} + \beta_5 DEP_{ijt} + \beta_6 LON_{ijt} + \beta_7 INF_{jt} + \beta_8 GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{it} \quad (1)$$

$$ROE_{ijt} = \gamma_0 + \gamma_1 ROE_{ijt-1} + \gamma_2 BSZ_{ijt} + \gamma_3 CAR_{ijt} + \gamma_4 NPL_{ijt} + \gamma_5 DEP_{ijt} + \gamma_6 LON_{ijt} + \gamma_7 INF_{jt} + \gamma_8 GDP_{jt} + \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

where β_i and γ_i (i = 1,2,…, 8) are coefficients and $\eta_i + \lambda_t + \varepsilon_{it}$ are composite error terms.

Justification of Variables

Financial performance is the dependent variable, while the *ROA* and the *ROE* are the two measures of financial performance of banks as employed by Asutay and Othman (2020). The *ROA* is measured by the

proportion of the bank's net profit to the total assets, as seen in Aebi et al. (2012), Díaz and Huang (2017) and Ghenimi et al. (2017b). The *ROE* is measured by the proportion of the bank's net profit to total equity, as was used in Abor et al. (2018), Adesina and Mwamba (2018) and Díaz and Huang (2017). The natural logarithm of total assets measures the primary independent variable of interest bank size (*BSZ*) in millions (Abu-Serdaneh, 2018; Adesina & Mwamba, 2018; Amoozegar et al., 2017). Other bank-specific variables include capital adequacy ratio (*CAR*) measured by the ratio of total equity to the entire asset, as used in Ashraf et al. (2018), Drehmann et al. (2010) and Ghenimi et al. (2017a).

Table 1

Variable Measurement

Variable	Measurement	Notation
Return on asset	The proportion of bank's net profit to total asset	ROA_{ijt}
Return on equity	The proportion of bank's net profit to total equity	ROE_{ijt}
Bank size	Natural logarithm of total asset (millions)	BSZ_{ijt}
Capital adequacy ratio	Ratio of total equity to total asset	CAR_{ijt}
Non-performing loan	Ratio of non-performing loan to total loan	NPL_{ijt}
Deposit ratio	Ratio of total deposit to total asset	DEP_{ijt}
Loan ratio	Ratio of total loan to total asset	LON_{ijt}
Inflation	Annual consumer price index percent	INF_{jt}
Gross Domestic Product	GDP growth rate in percentage	GDP_{jt}

Note. Source is the author's compilation based on the literature, 2020.

The *NPL* was measured by the ratio of *NPL* to the total loan, as was used by Jiang and Zhangi (2018), Partovi and Matousek (2019) and Zhu et al. (2015). The *DEP* was measured by the total deposit to total assets (Ly & Shimizu, 2018; Varotto & Zhao, 2018; Willem, 2013).

The *LON* was measured by the whole loan to total assets (Abor et al., 2018; Altunbas & Marques, 2008; Willem, 2013). The two macroeconomic variables used were the *INF* and the *GDP*. The *INF* was measured by annual consumer price index percent, as was used in Abbes and Mahdi (2018), Abdul-Rahman et al. (2018) and Berglund and Mäkinen (2019). The *GDP* was measured by the growth rate in percentage, as was used in Abbes and Mahdi (2018), Díaz and Huang (2017) and Waemustafa and Sukri (2015).

The net interest margin was used as a robustness-dependent variable alternative measurement. Net interest margin (*NIM*) was measured as net interest income to total asset ratio, as was used in Ashraf et al., 2018; Hong et al., 2014). The CAR was adopted and calculated by total capital to total assets, as was used by (Varotto & Zhao, 2018), and leverage ratio (*LEV*) was calculated by total debt to total capital, as was used by (Bostandzic & Weiß, 2018; Waemustafa & Sukri, 2015) for robustness. The *CAR* and the *LON* were dropped from the baseline model. Table 1 shows a detailed description of the variables.

Table 2

Sample of Banks in Six SSA Countries

Country	No. of banks	Sample of banks based on data availability
Nigeria	16	14
Ghana	9	9
South Africa	17	9
Kenya	20	10
Zambia	7	3
Tanzania	15	7
Total	84	50

Note. Source is the author's compilation based on the available data, 2020

Data and Sampling Method

A panel data consisting of 50 listed commercial banks over nine years (2011-2019) was used. The convenience sampling technique used was based on data availability within the period. The panel provided 450 observations from the six *SSA* countries, comprising Nigeria, Ghana,

South Africa, Zambia, Kenya, and Tanzania. The countries adopted were a good representation of the region, based on the International Institute of Finance (*IIF*) report in 2016, which classified the nations mentioned above as the financial market's largest hub within the *SSA* region.

Analysis Technique

The study employed a dynamic estimation technique of generalized method of moment (GMM), developed by Arellano and Bond in 1991, and improved upon by Blundell and Bond in 1995. The GMM technique is appropriate with micro panel data consisting of not less than 50 sample units over a period between 3 to 9 years. The method starts with differenced GMM, in one-step and two-step before, the system GMM evolved in one-step and two-step. The two-step system GMM was adopted because it could provide consistent estimates and mitigate endogeneity bias in the model (Mohammed & Musa, 2020). Previous studies in the literature used mainly the classical ordinary least square regression which has many shortcomings, primarily when dealing with a large set of data.

The two-step system GMM provides a consistent and efficient co-efficient value, despite having predictor variables that are not mainly exogenous and even if autocorrelation and heteroscedasticity exist within (Ahmed et al., 2018). The technique of the two-system GMM steadiness relies on two diagnostic tests: an autocorrelation test of the error terms and the Sargan test for instrument validity. The Sargan test, which tests for over-identifying restriction, will first identify the model specification or evaluate the instrument's reality related to the error term (Yahaya et al., 2020).

RESULT AND DISCUSSION

Descriptive Statistics

Table 3 displays the descriptive statistics of the study. The data comprised 450-year observations, obtained from 50 banks over a period of nine years. The mean value of the *ROE* was by far greater than that of the *ROA*. This was therefore, an indication of the more significant contribution of the *ROE* to the financial performance of

the banks compared to the *ROA*. Moreover, the standard deviation of the two dependent variable measures indicated a greater spread of the *ROE* around the mean. The *ROA* indicated a more consistent estimation in the data distribution. The primary independent variable *BSZ* had a mean value close to the *ROE,* but the standard deviation indicated a more consistent spread of *BSZ* data around the mean. This means that on average, the banks across the SSA was within the same size range. Among other bank-specific variables, the *DEP* had the highest mean value while the *CAR* had the highest standard deviation, which indicated a more better dispersion of the *CAR* over the mean. The *NPL* maintained the lowest mean value and the standard deviation demonstrated the consistency of the *NPL* data distribution. The two macroeconomic level variables included in the model were the *INF* and the *GDP*. The *INF* had a slightly more excellent mean value over the *GDP*. The *GDP* had the lowest standard deviation, which indicated the minor deviation of its data over the mean and implied a more consistent data distribution.

Table 3

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ROA_{ijt}	450	2.71	1.70	0.52	9.97
ROE_{ijt}	450	18.43	13.48	6.78	98.37
BSZ_{ijt}	450	18.68	2.71	12.59	22.62
CAR_{ijt}	450	29.06	20.02	0.86	101.01
NPL_{ijt}	450	5.30	6.30	0.02	69.33
DEP_{ijt}	450	66.18	17.70	4.81	158.75
LON_{ijt}	450	58.50	14.56	8.43	95.20
INF_{jt}	450	9.22	3.99	3.49	17.87
GDP_{jt}	450	4.76	2.91	-1.62	14.05

Note. Source is the STATA 15 Output

Correlation Matrix

Table 4a and Table 4b show the results of the correlation analysis. Table 4a explains the first correlation matrix with the *ROA* as the dependent

variable. The *ROA* is the return on assets and one of the financial performance measures. The ROA maintained a moderate negative association with the *BSZ*, which was the independent variable in the model. A shallow positive relationship between the *ROA* and the *CAR* obtained in the matrix, with a low negative relationship between the *ROA* and the *NPL*.

Moreover, the association between the *ROA* and the *DEP* was positive, while the *ROA* and the *LON* indicated a low negative relationship. The *INF* maintained a negative relationship with the *ROA*, while the *GDP* maintained a moderate positive association with the *ROA*. The co-efficient in the matrix indicated an absence of multicollinearity.

Table 4a

Correlation Matrix between Bank Size and ROA

	ROA_{ijt}	BSZ_{ijt}	CAR_{ijt}	NPL_{ijt}	DEP_{ijt}	LON_{ijt}	INF_{jt}	GDP_{jt}
ROA_{ijt}	1							
BSZ_{ijt}	-0.3008	1						
CAR_{ijt}	0.0856	-0.2051	1					
NPL_{ijt}	-0.0570	-0.0265	-0.0975	1				
DEP_{ijt}	0.1933	0.1359	-0.1376	0.0259	1			
LON_{ijt}	-0.1079	0.1294	0.1743	-0.1862	0.0354	1		
INF_{jt}	-0.006	-0.0908	-0.1767	0.1712	-0.0201	-0.393	1	
GDP_{jt}	0.2719	-0.335	0.1001	0.0066	0.0496	-0.1627	-0.1637	1

Note. Source is the STATA 15 Output

Table 4b explains the second correlation matrix with the *ROE* as the dependent variable. The *ROE* is the return on equity and the second measure of financial performance employed. The *ROE* and the *BSZ* have maintained a low negative association. The *ROE* and the *CAR* sustained a positive relationship in the matrix. On the other hand, the relationship between the *ROE* and the *NPL* was low and negative. The *DEP* maintained a positive association with the *ROE*, while the *LON* and the *ROE* revealed a negative relationship. The *INF* indicated a negative relationship with the *ROE*, while the *GDP* and the *ROE* maintained a moderate positive association. There was also an absence of multicollinearity among the variable in this matrix.

Table 4b

Correlation Matrix between Bank Size and ROE

	ROE_{ijt}	BSZ_{ijt}	CAR_{ijt}	NPL_{ijt}	DEP_{ijt}	LON_{ijt}	INF_{jt}	GDP_{jt}
ROE_{ijt}	1							
BSZ_{ijt}	-0.0793	1						
CAR_{ijt}	0.0631	-0.2051	1					
NPL_{ijt}	-0.0360	-0.0265	-0.0975	1				
DEP_{ijt}	0.1290	0.1359	-0.1376	0.0259	1			
LON_{ijt}	-0.0794	0.1294	0.1743	-0.1862	0.0354	1		
INF_{jt}	-0.0023	-0.0908	-0.1767	0.1712	-0.0201	-0.3903	1	
GDP_{jt}	0.2203	-0.3350	0.1001	0.0066	0.0496	-0.1627	-0.1637	1

Note. Source is the STATA 15 Output

Multicollinearity Test

The multicollinearity test is to determine its presence or otherwise among the independent variables used in the study. The variance inflation factor (VIF) and tolerance level were computed, and their results showed that none of the VIF figures were up to 3.3, which was the threshold required for the presence of multicollinearity.

Table 5

Multicollinearity Test

Variable	VIF	1/VIF
INF_{jt}	1.32	0.76
LON_{ijt}	1.31	0.76
GDP_{jt}	1.26	0.79
BSZ_{ijt}	1.23	0.81
CAR_{ijt}	1.13	0.88
NPL_{ijt}	1.05	0.95
DEP_{ijt}	1.05	0.95
Mean VIF	1.19	

Note. Source is the STATA 15 output

DISCUSSION OF REGRESSION RESULTS

The main findings in the study revealed a highly significant negative association between bank size and performance. As given in the variable description, bank size measure by the natural logarithm of the total asset (millions), and bank performance is proxy by two criteria; the *ROA* and the *ROE*. It implies that if there is a one percent increase in bank size, it will decrease the bank's performance accordingly. This further means that the size of banks did not determine the level of profit gain by banks in the region.

Moreover, the study indicated that there was an inverse relationship between bank size and bank performance. This implies that as the bank size decreases, the profit of the bank increases; on the other hand, as the size of the bank increases, its performance will increase. Furthermore, the relationship between non-performing loans and bank size was found be negative and significant. This implies that the increase in the rate of non-performing loans will negatively affect bank performance.

First Regression Result

This regression aims to estimate the effect of bank size on the performance of banks in the SSA Table 6 shows the estimation result of the *ROA* model using a one-step difference GMM, two-step difference GMM, one-step system GMM and two-step system GMM. The inferences made in this study were based on the two-step system GMM because of the model's reliability in providing consistent estimates and addressing the endogeneity problem. The coefficient of the *BSZ* was statistically significant at the 1 percent level. Since the coefficient sign of the *BSZ* was negative, it had a negative relationship with the *ROA*. The result indicated that any percentage increase in the size of the bank would result in a decrease in the performance of banks in the SSA. The finding of this study is consistent with the findings obtained by Luo et al. (2016) and Waemustafa and Sukri (2015).

Other bank-specific revealed the following findings. The *CAR* was significant at 1 percent and positively related to the *ROA* of banks across the region. Therefore, it implies that an increase in the level of capital contribution significantly increases banking performance in the area.

Table 6

Regression Result 1: Dependent Variable is the ROA

Variables	ROA			
	(1) One-step Diff. GMM	(2) Two-step Diff. GMM	(3) One-step Syst. GMM	(4) Two-step Syst. GMM
ROA_{1-ijt}	0.51***	0.50***	0.66***	0.66***
	(0.06)	(0.01)	(0.04)	(0.01)
BSZ_{ijt}	-0.35***	-0.32***	-0.43***	-0.43***
	(0.08)	(0.06)	(0.03)	(0.04)
CAR_{ijt}	0.01	0.01***	0.00	0.01***
	(0.00)	(0.00)	(0.01)	(0.00)
NPL_{ijt}	-0.01	-0.01***	-0.02**	-0.02***
	(0.00)	(0.00)	(0.01)	(0.00)
DEP_{ijt}	0.00	0.04**	0.02	0.03***
	(0.01)	(0.00)	(0.01)	(0.00)
LON_{ijt}	-0.00	0.00	-0.00	-0.02***
	(0.01)	(0.00)	(0.01)	(0.00)
INF_{ijt}	-0.01	-0.01***	0.03**	0.03***
	(0.01)	(0.00)	(0.01)	(0.00)
GDP_{ijt}	0.04**	0.02***	0.09***	0.08***
	(0.02)	(0.01)	(0.02)	(0.00)
Observations	350	350	400	400
Number of banks	50	50	50	50
Diagnostic test				
Mean VIF	1.19			
Number of Instruments	35	35	42	42
AR[1] *p*-value	0.00	0.09	0.00	0.27
AR[2] *p*-value	0.68	0.81	0.73	0.82
Sargan test: *p*-value	0.82	0.28	0.33	0.77

Note. ***, ** and * indicate significance at the 1%, 5% and 10% significant level, respectively.

The increase in the capital adequacy ratio may take the form of an increase in the balance, which is in line with the findings of Bitar et al. (2018) and Díaz and Huang (2017). The NPL was significant and

negatively related to the *ROA* and indicated a decrease in banks' *ROA,* with an increase in the level of non-performing loans. This finding is also consistent with what was obtained in the studies by Partovi and Matousek (2019) and Zhu et al. (2015). The *DEP* was significant at one percent and positively associated with the *ROA* of banks, a finding consistent with that in Hoffmann (2011); while the *LON* was significant and negatively related to the *ROA*, this is consistent with the findings of Aebi et al. (2012) and Battaglia and Gallo (2015).

The macroeconomic variables used in the model were the *GDP* and the *INF*. The coefficient of the *GDP* was statistically significant at the one percent level and positively related to the ROA. It means that an increase in the the *GDP* rate increases the *ROA* of the SSA banks. Moreover, the INF was statistically significant and positively related to the *ROA*, which indicated an increase in the *INF* rate would positively affect the *ROA* of banks within the SSA region. These results are consistent with the findings of Albertazzi and Gambacorta (2009) and Goddard et al. (2010).

The model has revealed an absence of the multicollinearity problem in the diagnostic checking, with a mean VIF of 1.19. The Arellano and Bond test for autocorrelation showed a significant *p*-value in the first-order autocorrelation with an insignificant *p*-value in the second-order autocorrelation, which overall indicated an absence of autocorrelation. The Sargan test for over-identifying restriction revealed a nominal *p*-value, which means that the instrument used in the study is highly valid.

Second Regression Result

Table 7 shows the result of the *ROE* model using the one-step difference GMM, two-step difference GMM, one-step system GMM and two-step system GMM. This regression was aimed at evaluating the impact of bank size on bank performance in the SSA and as depicted by the *ROE*. All the four models presented in Table 7 are significant, which signifies the appropriateness of using the dynamic model in the study. The co-efficient of the *BSZ* was statistically significant at one percent and negatively correlated with the *ROE*. This implies that a one percent increase in the size of the bank may result in a decrease in bank performance across the SSA region. The result is in line with the findings of Ghenimi et al. (2017b) and Kasman et al. (2010).

Table 7

Regression Result 2: Dependent Variable is the ROE

	ROE			
Variables	(1) One-step Diff. GMM	(2) Two-step Diff.GMM	(3) One-step Syst.GMM	(4) Two-step Syst.GMM
$ROE_{1\text{-}ijt}$	0.71***	0.73***	0.70***	0.70***
	(0.08)	(0.01)	(0.06)	(0.01)
BSZ_{ijt}	-1.64	-2.18***	-0.52***	-0.48***
	(1.19)	(0.52)	(0.04)	(0.08)
CAR_{ijt}	0.01	0.02**	0.02	0.02***
	(0.07)	(0.01)	(0.06)	(0.01)
NPL_{ijt}	-0.01	-0.05	-0.14***	-0.12***
	(0.12)	(0.05)	(0.01)	(0.03)
DEP_{ijt}	0.07	0.09***	0.06	0.07***
	(0.01)	(0.02)	(0.07)	(0.01)
LON_{ijt}	-0.14	-0.13***	-0.04	-0.03*
	(0.11)	(0.02)	(0.09)	(0.02)
INF_{jt}	0.47**	0.43***	0.26***	0.25***
	(0.21)	(0.05)	(0.02)	(0.03)
GDP_{jt}	0.18	0.04	0.47*	0.43***
	(0.29)	(0.09)	(0.26)	(0.04)
Observations	350	350	400	400
Number of banks	50	50	50	50
Diagnostic test				
Mean VIF	1.19			
Number of Instruments	35	35	42	42
AR[1] *p*-value	0.00	0.00	0.00	0.00
AR[2] *p*-value	0.41	0.20	0.81	0.18
Sargan test: *p*-value	0.39	0.10	0.46	0.17

Note. *** , ** and * indicate significance at the 1%, 5% and 10% significant level, respectively.

Other bank-specific revealed the following relationship. The *CAR* had a coefficient that was significant at one percent and positively related with the *ROE* of banks. The finding means that the higher level of

capital of banks, the better the performance of the banks in terms of their *ROE*. This is consistent with the results of Abou-El-Sood, (2016) and Ashraf et al. (2018). The *NPL* had a coefficient that was significant at one percent and negatively affected the *ROE* of banks. Therefore, an increase in the level of the *NPL* would result in a decrease in the banks' *ROE*. This confirms the result obtained by Lafuente et al. (2019) and Zhang et al. (2016). The *DEP* was significant at one percent and positively affects banks' *ROE*, while *LON* is substantial at ten percent and negatively associated with *ROE* of banks. The result, therefore, is consistent with the findings obtained by Altunbas and Marques (2008).

The macroeconomic level variables, the *GDP* and the *INF* had a positive coefficient that was significant at one percent and positively associated with the *ROE* of banks in the SSA region. An increase in the rate of the *GDP* positively affected the *ROE* of banks within the SSA region. Likewise, an increase in the rate of the INF might result in an increase in the banks' *ROE* within the region. This finding is consistent with Dietrich and Wanzenried, (2011) and Molyneux and Thornton (1992).

From the diagnostic test conducted, the result revealed an absence of the multicollinearity problem. The mean VIF demonstrated a value less than 10, which was 1.19, implying a lack of multicollinearity. The Arellano and Bond first and the second test for autocorrelation were estimated. The result revealed a significant p-value in the first order with an insignificant *p*-value in the second-order autocorrelation, and the overall model thus, implied an absence of the autocorrelation problem. The Sargan test for over-identifying restriction showed a nominal *p*-value, indicating that the instrument used in the model is valid.

The study estimates did not support the first hypothesis, which proposed a positive relationship between bank size and bank performance. As a result, it has implied a negative relationship between the *BSZ* and the *ROA* and the *ROE* of banks in the SSA. Overall, the result did not support the general banking hypothesis of 'too big to fail.' Furthermore, the second hypothesis did endorse the study's findings, that there was a significant relationship between non-performing loans and bank performance in the SSA.

Robustness Analysis

This regression was aimed at testing the robustness of the earlier result obtained by modifying the study's baseline model, with a different measure of firm performance in the regression analysis, the capital asset ratio (*CAS*), net interest margin (NIM).

Table 8

Robustness Regression

	NIM			
	(1)	(2)	(3)	(4)
Variables	One-step Diff. GMM	Twostep Diff. GMM	One-step Syst. GMM	Twostep Syst.GMM
$NIM_{1\text{-}ijt}$	0.77***	0.70***	0.58***	0.59***
	(0.14)	(0.07)	(0.04)	(0.01)
BSZ_{ijt}	-0.14	-0.61***	-0.81***	-0.70***
	(0.69)	(0.06)	(0.22)	(0.07)
CAS_{ijt}	0.11	0.09***	0.09	0.07***
	(0.01)	(0.02)	(0.08)	(0.01)
NPL_{ijt}	-0.12*	-0.08**	-0.15**	-0.16***
	(0.07)	(0.04)	(0.06)	(0.03)
DEP_{ijt}	0.06	0.03**	0.04	0.04***
	(0.06)	(0.01)	(0.04)	(0.01)
LEV_{ijt}	0.02	0.02***	0.01	0.011***
	(0.02)	(0.00)	(0.02)	(0.00)
INF_{jt}	0.18	0.13***	-0.11	0.07***
	(0.12)	(0.02)	(0.09)	(0.02)
GDP_{jt}	0.01	-0.04	-0.05	0.03**
	(0.16)	(0.02)	(0.12)	(0.01)
Observations	350	350	400	400
Number of banks	50	50	50	50
Diagnostic test				
Mean VIF	1.12			
Number of Instruments	35	35	42	42
AR[1] *p*-value	0.00	0.20	0.03	0.00
AR[2] *p*-value	0.34	0.25	0.42	0.30
Sargan test: *p*-value	0.16	0.36	0.24	0.36

Note. *** p<0.01, ** p<0.05, * p<0.1

Other adjustments included introducing the *CAS* and leverage ratio to replace capital adequacy ratio and loan ratio in the model, as is presented in Table 8. As can be seen, four models of all the lagged dependents of the models were significant, which has justified the appropriateness of using a dynamic model.

The inference of the main result was based on the two-step system GMM. The primary independent variable of the model, the *BSZ*, was significant at one percent and negatively associated with the *NIM* of banks across the SSA. The finding is consistent with the results of Hoffmann (2011) and Luo et al. (2016). The *CAS* was positively significant, indicating a rise in the *NIM* of banks with an increase in the *CAS*. The *NPL* was substantial at one percent and negatively associated with the *NIM* of banks in the region. A high rate of the *NPL* has negatively affected the banks' *NIM*. The result obtained is similar to the result obtained by Partovi and Matousek (2019). The *DEP* was significant at one percent and positively related to banks' *NIM*. This result is consistent with that of Hoffmann (2011). The *LEV* revealed a significant positive effect. The findings imply that banks' *NIM* will increase with an increase in the *LEV* rate. These findings are consistent with those of Bostandzic and Weiß (2018) and Varotto and Zhao (2018).

The macroeconomic variables, including the *INF* and the *GDP*, were positive and significant at one percent and five percent, respectively. Any increase in the rate of the *INF* has positively affected the *NIM* of the SSA banks. Likewise, the *GDP* rate increase could positively impact the SSA banks' *NIM*. These findings are consistent with what was obtained by Albertazzi and Gambacorta (2009) and Dietrich and Wanzenried (2011).

The diagnostic test has revealed an absence of multicollinearity, and the mean VIF demonstrated a value of 1.12, which was less than 10. The Arellano and Bond test for first and second-order autocorrelation was also estimated. The first-order autocorrelation revealed a significant *p*-value, while the second-order autocorrelation revealed an insignificant *p*-value, which was the primary determinant of autocorrelation; hence, the model indicated the absence of an autocorrelation problem.

CONCLUSION AND POLICY IMPLICATION

This study has evaluated the effect of bank size on bank performance across the SSA region. The study found a significant and negative association between bank size and the financial performance of banks within the SSA region. It means that there was an inverse relationship between bank size and performance. A percentage increase in bank size negatively affected the performance of the banks. Furthermore the study indicated a significant and negative association between the non-performing loan and bank performance.

Moreover, the study revealed that increasing the capital level of the banks and keeping the non-performing loan within the barest minimum improved a bank's effectiveness. The study has policy implications for key stakeholders in the industry, including bank management, clients, academics, and the government. The study will enrich the knowledge of bank management in terms of understanding bank size association with financial performance. It can instill confidence among members of bank management to always explore other means of improving the performance of their banks, not just only focusing on increasing the size of the bank. Bank customers will generally appreciate the findings of this study as it will change the perception that they have always held, that larger banks perform better when compared to their smaller counterparts. The study will also undoubtedly provide a new data set in the context of the SSA, which will be useful for future reference. The government will also have some insights from the study, and that is to always ensure compliance to regulatory guidelines issued periodically by its agencies. All the findings and interpretation are however, valid only within the confines of the study scope and the context in which the study was carried out. Therefore, any over generaliziation beyond that scope could be misleading.

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REFERENCES

Abbes, M. B., & Mahdi, I. B. S. (2018). Relationship between capital, risk and liquidity : A comparative study between Islamic and

conventional banks in MENA region. *Research in International Business and Finance*, *45*, 588–596. https://doi.org/10.1016/j.ribaf.2017.07.113

Abdelaziz, H., Rim, B., & Helmi, H. (2020). The interactional relationships between credit risk, liquidity risk and bank profitability in MENA region. *Global Business Review*, 1–23. https://doi.org/10.1177/0972150919879304

Abdul-Rahman, A., Sulaiman, A. A., & Mohd Said, N. L. H. (2018). Does financing structure affects bank liquidity risk? *Pacific Basin Finance Journal*, *52*, 26–39. https://doi.org/10.1016/j.pacfin.2017.04.004

Abor, J., Aboagye, A. Q. ., Amidu, M., & Sarpong-kumankoma, E. (2018). Freedom , competition and bank profitability in Sub-Saharan Africa. *Journal of Financial Regulation and Compliance*, *Vol. 26*(4), 462–481. https://doi.org/10.1108/JFRC-12-2017-0107

Abou-El-Sood, H. (2016). Are regulatory capital adequacy ratios good indicators of bank failure? Evidence from US banks. *International Review of Financial Analysis*, *48*, 292–302. https://doi.org/10.1016/j.irfa.2015.11.011

Abu-serdaneh, J. (2018). Bank loan-loss accounts, income smoothing, capital management, signaling and procyclicality Evidence from Jordan. *Journal of Financial Reporting and Accounting*, *16*(4), 677–693. https://doi.org/10.1108/JFRA-06-2016-0041

Adesina, K., & Mwamba, J. (2018). Linking bank regulatory capital buffer to business cycle fluctuations do revenue diversification, market power and Cost of funding matter? *Journal of Economic Studies*, *45*(3), 565–585. https://doi.org/10.1108/JES-05-2017-0112

Aebi, V., Sabato, G., & Schmid, M. (2012). Risk management, corporate governance, and bank performance in the financial crisis. *Journal of Banking and Finance*, *36*, 3213–3226. https://doi.org/10.1016/j.jbankfin.2011.10.020

Ahmed, M. D., Fauziah, B. M., & Noor Azman, B. L. (2018). Funding liquidity risk and bank risk-taking in BRICS countries An application of system GMM approach. *International Journal of Emerging Markets*, *13*(1), 231–248. https://doi.org/10.1108/IJoEM-03-2017-0086

Albertazzi, U., & Gambacorta, L. (2009). Bank profitability and the business cycle. *Journal of Financial Stability*, *5*, 393–409. https://doi.org/10.1016/j.jfs.2008.10.002

Altunbas, Y., & Marques, D. (2008). Mergers and acquisitions and bank performance in Europe : The role of strategic similarities. *Journal of Economics and Business*, *60*, 204–222. https://doi.org/10.1016/j.jeconbus.2007.02.003

Amoozegar, A., Pukthuanthong, K., & Walker, T. J. (2017). On the role of the chief risk officer and the risk committee in insuring financial institutions against litigation. *Managerial Finance*, *43*(1), 19–43. https://doi.org/10.1108/MF-05-2016-0127

Ashraf, B., Rahman, M., Rahman, M., & Zheng, C. (2018). Capital requirements, the cost of financial intermediation and bank risk-taking : Empirical evidence from Bangladesh. *Research in International Business and Finance*, *44*, 488–503. https://doi.org/10.1016/j.ribaf.2017.07.119

Asutay, M., & Othman, J. (2020). Alternative measures for predicting financial distress in the case of Malaysian Islamic banks: Assessing the impact of global financial crisis. *Journal of Islamic Accounting and Business Research*, *11*(9), 1827–1845. https://doi.org/10.1108/JIABR-12-2019-0223

Athanasoglou, P., Manthos, D., & Christos, S. (2006). Determinants of bank profitability in the South Eastern European Region. *MPRA Working Paper*, 1–31. http://mpra.ub.uni-muenchen.de/10274/

Barros, C., Managi, S., & Matousek, R. (2012). The technical efficiency of the Japanese banks : Non-radial directional performance measurement with undesirable output. *Omega*, *40*(1), 1–8. https://doi.org/10.1016/j.omega.2011.02.005

Battaglia, F., & Gallo, A. (2015). Risk governance and Asian bank performance: An empirical investigation over the financial crisis. *Emerging Markets Review*, *25*, 53–68. https://doi.org/10.1016/j.ememar.2015.04.004

Beck, R., Jakubik, P., & Piloiu, A. (2015). Key Determinants of Non-performing Loans: New Evidence from a Global Sample. *Open Economies Review*, *26*(3), 525–550. https://doi.org/10.1007/s11079-015-9358-8

Berglund, T., & Mäkinen, M. (2019). Do banks learn from financial crisis? The experience of Nordic banks. *Research in International Business and Finance*, *47*, 428–440. https://doi.org/10.1016/j.ribaf.2018.09.004

Bikker, J. A., & Bos, J. W. (2014). *Bank Performance : A theoretical and empirical framework for the analysis of profitability, competition, and efficiency*. Taylor and Francis Group. https://doi.org/10.4324/9780203030899

Biswas, S. S., Gómez, F., & Zhai, W. (2017). Who needs big banks ? The real effects of bank size on outcomes of large US borrowers. *Journal of Corporate Finance*, *46*, 170–185. https://doi.org/10.1016/j.jcorpfin.2017.06.012

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

Bostandzic, D., & Weiß, G. N. F. (2018). Why do some banks contribute more to global systemic risk? *Journal of Financial Intermediation*, *35*, 17–40. https://doi.org/10.1016/j.jfi.2018.03.003

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance*, *13*, 65–79.

Bouzgarrou, H., Jouida, S., & Louhichi, W. (2018). Research in International Business and Finance Bank profitability during and before the financial crisis: Domestic versus foreign banks, *44*(January 2017), 26–39. https://doi.org/10.1016/j.ribaf.2017.05.011

Boyd, J., & Runkle, D. (1993). "Size and performance on banking firms: Testing the predictions of theory." *Journal of Monetary Economics*, *31*(1), 47–67.

Chand, S. A., Kumar, R. R., & Stauvermann, P. J. (2021). Determinants of bank stability in a small island economy: A study of Fiji. *Accounting Research Journal*, *34*(1), 22–42. https://doi.org/10.1108/ARJ-06-2020-0140

Cohen, W. M., Nelson, R. R., & Walsh, J. P. (2002). Links and impacts: The influence of public research on industrial R&D. *Management Science*, *48*(1), 1–23. https://doi.org/10.1287/mnsc.48.1.1.14273

Dávila, E., & Walther, A. (2020). Does size matter? Bailouts with large and small banks. *Journal of Financial Economic*, *136*, 1–22. https://doi.org/10.1016/j.jfineco.2019.09.005

de Haan, J., & Poghosyan, T. (2012). Size and earnings volatility of US bank holding companies. *Journal of Banking and Finance*, *36*(11), 3008–3016. https://doi.org/10.1016/j.jbankfin.2012.07.008

Díaz, V., & Huang, Y. (2017). The role of governance on bank liquidity creation. *Journal of Banking and Finance*, *77*, 137–156. https://doi.org/10.1016/j.jbankfin.2017.01.003

Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions & Money*, *21*(3), 307–327. https://doi.org/10.1016/j.intfin.2010.11.002

Drehmann, M., Sorensen, S., & Stringa, M. (2010). The integrated impact of credit and interest rate risk on banks: A dynamic framework and stress testing application. *Journal of Banking and Finance*, *34*(4), 713–729. https://doi.org/10.1016/j.jbankfin.2009.06.009

Forbes, D. P., & Milliken, F. J. (1999). Cognition and corporate governance: Understanding boards of directors as strategic decision making groups. *Academy of Management*, *24*(3), 489–505. https://doi.org/10.4324/9780203888711

Gabaix, X., & Landier, A. (2008). Why has CEO Pay Increased So Much? *The Quarterly Journal of Economics*, *123*(1), 49–100.

Ghenimi, A., Chaibi, H., & Omri, M. A. (2017a). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. *Borsa Istanbul Review*, *17*(4), 238–248. https://doi.org/10.1016/j.bir.2017.05.002

Ghenimi, A., Chaibi, H., & Omri, M. A. B. (2017b). The effects of liquidity risk and credit risk on bank stability: Evidence from the MENA region. *Borsa Istanbul Review*, *17*(4), 238–248. https://doi.org/10.1016/j.bir.2017.05.002

Ghosh, R., Sen, K. K., & Riva, F. (2020). Behavioral determinants of nonperforming loans in Bangladesh. *Asian Journal of Accounting Research*, *5*(2), 327–340. https://doi.org/10.1108/ajar-03-2020-0018

Goddard, J., Liu, H., & Molyneux, P. (2010). The persistence of bank profit. *Journal of Banking and Finance*, *35*(11), 2881–2890.

Goddard, J., Molyneux, P., & Wilson, J. O. (2004). The profitability of European Banks: A cross-sectional and dynamic panel analysis. *The Manchester School*, *72*(3), 363–381.

Grechyna, D. (2018). Firm size, bank size, and financial development. *Journal of Economic Dynamics and Control*, *97*, 19–37. https://doi.org/10.1016/j.jedc.2018.09.004

Haniffa, R., & Hudaib, M. (2006). Governance structure and firm performance of Malaysian companies. *Journal of Business Finance & Accounting*, *33*(7/8), 1034-1062.

Hassan Al-Tamimi, H. A., & Charif, H. (2011). Multiple approaches in performance assessment of UAE commercial banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *4*(1), 74–82. https://doi.org/10.1108/17538391111122212

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

Hong, H., Huang, J., & 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

Jensen, M. C., & Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305-360.

Jensen, M. (1986). American economic association agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, *76*(2), 323–329.

Jiang, G., Tang, E., & Sze. (2003). "Determinant of bank profitability in Hong Kong." *Hong Kong Monetary Authority Research Memorandum, September*. http://hk/media/eng/publication-and-research/quarterly-bulletin/qb200309/fal1.pdf(access 24 November, 2020

Jiang, H., & Zhangi, J. (2018). Capital regulatory pressure, charter value and bank risk-taking : Empirical evidence for China. *Journal of Financial Regulation and Compliance*, *26*(1), 170–186. https://doi.org/10.1108/JFRC-01-2017-0002

Joaqui-Barandica, O., Manotas-Duque, D. F., & Uribe-Gil, J. M. (2021). Commonality, macroeconomic factors and banking profitability. *Working Paper*, *13*(1/38). http://diposit.ub.edu/dspace/handle/2445/178899#.YOgRsclgON8.mendeley

Karyani, E., Dewo, S. A., Santoso, W., & Frensidy, B. (2020). Risk governance and bank profitability in ASEAN-5: A comparative and empirical study governance. *International Journal of Emerging Markets*, *15*(5), 949–969. https://doi.org/10.1108/IJOEM-03-2018-0132

Kasman, A., Tunc, G., Vardar, G., & Okan, B. (2010). Consolidation and commercial bank net interest margins: Evidence from the old and new European Union members and candidate countries. *Economic Modelling*, *27*(3), 648–655. https://doi.org/10.1016/j.econmod.2010.01.004

Killins, R. N., Carolina, S., Johnk, D. W., & Egly, P. V. (2020). The impact of financial regulation policy uncertainty on bank profits

and risk. *Studies in Economies and Finance*, *37*(4), 725–752. https://doi.org/10.1108/SEF-05-2019-0169

Kosmidou, K., Pasiouras, F., & Tsaklanganos, A. (2007). Domestic and multinational determinants of foreign bank profits: The case of Greek banks operating abroad. *Journal of Multi Financial Management*, *17*, 1–15. https://doi.org/10.1016/j.mulfin.2006.02.002

Laeven, L., Ratnovski, L., & Tong, H. (2014). Bank size and systemic Risk. *Journal of International Money and Finance*, *82*, 45–70. https://www.sciencedirect.com/science/article/pii/S0261560617302425

Laeven, Luc & Levine, R. (2009). Bank governance, regulation and risk taking. *Journal of Financial Economics*, *93*(2), 259–275. https://doi.org/10.1016/j.jfineco.2008.09.003

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2019). Conformance and performance roles of bank boards: The connection between non-performing loans and non-performing directorships. *European Management Journal*, *37*(5), 664–673. https://doi.org/10.1016/j.emj.2019.04.005

Le, M., Hoang, V. N., Wilson, C., & Ngo, T. (2020). Risk-adjusted efficiency and bank size in a developing economy: An analysis of Vietnamese banks. *Journal of Economic Studies*, *47*(2), 386–404. https://doi.org/10.1108/JES-12-2018-0425

Li, R., Li, L., & Zou, P. (2021). Credit risk shocks and banking efficiency : A study based on a bootstrap-DEA model with nonperforming loans as bad output. *Journal of Economic Studies*, *48*(1), 1–19. https://doi.org/10.1108/JES-08-2019-0395

Lorenc, A. G., & Zhang, J. Y. (2020). How bank size relates to the impact of bank stress on the real economy. *Journal of Corporate Finance*, *62*, 101592. https://doi.org/10.1016/j.jcorpfin.2020.101592

Luo, Y., Tanna, S., & Vita, G. D. (2016). Financial openness, risk and bank efficiency: Cross-country evidence. *Journal of Financial Stability*, *24*, 132–148. https://doi.org/10.1016/j.jfs.2016.05.003

Ly, K. C., & Shimizu, K. (2018). Funding liquidity risk and internal markets in multi-bank holding companies: Diversification or internalization? *International Review of Financial Analysis*, *57*, 77–89. https://doi.org/10.1016/j.irfa.2017.12.011

Mahrous, S, N., Samak, N., & Abdelsalam, M. A. M. (2020). The effect of monetary policy on credit risk: Evidence from the

MENA region countries. *Review of Economics and Political Science*, *5*(4), 289–304. https://doi.org/10.1108/REPS-07-2019-0099

Mohammed, L., & Musa, A. M. (2020). Firm-specific determinants of debt maturity structure of listed non-financial firms in Nigeria. *Malaysian Management Journal*, *24*, 77–102. https://doi.org/10.32890/mmj.24.2020.9732

Molyneux, P., & Thornton, J. (1992). Determinants of European profitability: A note bank. *Journal of Banking and Finance*, *16*, 1173–1178.

Murphy, K. (1985). Corporate performance and managerial remuneration: An empirical analysis. *Journal of Accounting and Economics*, *7*(3), 11–42.

Naceur, S. B., & Goaied, M. (2001). The determinants of the Tunisian deposit banks' performance. *Applied Financial Economics*, *11*, 1–4. https://doi.org/10.1080/096031001300138717

Naceur, S. B., & Omran, M. (2011). The effects of bank regulations, competition, and financial reforms on banks' performance. *Emerging Markets Review*, *12*(1), 1–20. https://doi.org/10.1016/j.ememar.2010.08.002

Noman, A. H., Isa, C. R., & Sok-gee, C. (2021). Impact of activity restrictions on risk taking of banks: Does competition matter during crisis? *Journal of Financial Regulation and Compliance*, *29*(1), 79–103. https://doi.org/10.1108/JFRC-07-2019-0095

Ozili, P. K. (2020). Banking sector earnings management using loan loss provisions in the Fintech era. *International Journal of Managerial Finance*. https://doi.org/10.1108/IJMF-07-2020-0369

Partovi, E., & Matousek, R. (2019). Bank efficiency and non-performing loans: Evidence from Turkey. *Research in International Business and Finance*, *48*, 287–309. https://doi.org/10.1016/j.ribaf.2018.12.011

Rahmi, M., & Sari, R. (2019). Risk-based bank ratio on profitability of Sharia banking. *Econosains*, *17*(2), 1–8.

Sakawa, H., Watanabel, N., Sasaki, H., & Tanahashi, N. (2020). Bank valuation and size: Evidence from Japan. *Pacific-Basin Finance Journal*, *63*(August), 101403. https://doi.org/10.1016/j.pacfin.2020.101403

Saleh, I., & Abu Afifa, M. (2020). The effect of credit risk, liquidity risk and bank capital on bank profitability: Evidence from an

emerging market. *Cogent Economics and Finance*, *8*(1), 1–13. https://doi.org/10.1080/23322039.2020.1814509

Smirlock, M. (2013). Evidence on the (Non) Relationship between Concentration and Profitability in Banking. *Journal of Money, Credit and Banking*, *17*(1), 69–83.

Sufian, F. (2012). For which option is credit risk more representative on China banks ' total factor productivity. *China Finance Review International,2*(2),20444-1398.https:doi.org/10.1108/20441391211215842

Sufian, F., & Chong, R. (2008). Determinants of bank profitability in a developing economy: Empirical evidence from the Philippines. *Asian Academy of Management Journal of Accounting and Finance*, *4*(2), 91–112. https://doi.org/10.3846/1611-1699.2009.10.207-217

Terraza, V. (2015). The effect of bank size on risk ratios: Implications of banks' performance. *Procedia Economics and Finance*, *30*(15), 903–909. https://doi.org/10.1016/s2212-5671(15)01340-4

Vanhoose, D. (2007). Theories of bank behavior under capital regulation. *Journal of Banking and Finance*, *31*, 3680–3697. https://doi.org/10.1016/j.jbankfin.2007.01.015

Varotto, S., & Zhao, L. (2018). Systemic risk and bank size. *Journal of International Money and Finance*, *82*, 45–70. https://doi.org/10.1016/j.jimonfin.2017.12.002

Waemustafa, W., & Sukri, S. (2015). Bank specific and macroeconomics dynamic determinants of credit risk in Islamic Banks and Conventional Banks. *International Journal of Economics and Financial Issues*, *5*(2), 476–481. https://doi.org/10.6084/m9.figshare.4042992

Willem, J. V. D. (2013). A macroprudential approach to address liquidity risk with the loan to deposit ratio. *DNB Working Paper*, *372*. Retrieved from https://ideas.repec.org/p/dnb/dnbwpp/372.html

Yahaya, A., Mahat, F., & Matemilola, B. T. (2020). Bank regulatory capital and performance: Evidence from Sub Saharan Africa. *Journal of Economic Cooperation and Development*, *41*(1), 31–60.

Zhang, D., Cai, J., Dickinson, D. G., & Kutan, A. M. (2016). Non-performing loans, moral hazard and regulation of the Chinese commercial banking system. *Journal of Banking and Finance*, *63*, 48–60. https://doi.org/10.1016/j.jbankfin.2015.11.010

Zhu, N., Wang, B., & Wu, Y. (2015). Productivity, efficiency, and non-performing loans in the Chinese banking industry. *The Social Science Journal*, *52*(4), 468–480. https://doi.org/10.1016/j.soscij.2014.10.003