

Interest Rate Spread as the “Power of Growth” on Financial Profitability” of Banks in Africa

¹Emmanuel Kwaku Manu, ^{1,2}Wen Xuezhou, ³Mary Akosuah Somuah

¹School of Management, Jiangsu University, Zhenjiang, Jiangsu Province, P. R. China

²School of Business, Jiangnan University, Wuxi, Jiangsu Province, P. R. China

³Valley View University, Ghana Techiman

ABSTRACT

Article Info

Volume 8 Issue 2

Page Number: 312-332

Publication Issue :

March-April-2021

Article History

Accepted : 15 April 2021

Published : 24 April 2021

The high-interest rate has postured solemn distresses to the administration, managers, firms, and the masses. Commercial banks in Africa, principally, are exasperated to use the policy rate to bring down loaning charges. Interest rate charges though have sustained to persist gluey downwards. This study considered the impact of interest rate as the power of growth on financial profitability and examine the causal link amid the measurement variables (bank credit, savings, non-performing loans, and interest rate) between 2000 and 2016. The countries used in this study were investigated as a whole panel and individually per country. First, considering the results from homogeneity assessment and Pesaran CD's checks, we detect the presence of heterogeneity and cross-sectional correlations for the explored data. Second, the CADF and CIPS panel unit root tests report that the variables are non-stationary at their stages but become stationary at their first transformations. Third, the Westerlund-Edgerton panel bootstrap cointegration test shows that the variables are cointegrated and hence possess a structural long-run relationship. Forth, results from the PMG estimator through the panel ARDL model show that; (1) A two-way connectedness is verge by bank credit and FP in the long-period and short-run; (2) A positive and significant one-way cause running from NPLs to BC, a one-way cause amid interest rate and bank credit and lastly one-way causality only in the long-period for NPLs and SAV are evidenced; (3) The PMG estimator through the panel ARDL framework is evidenced to be very significantly effective to the application of Granger causatives test. Though different parameter estimates are evidenced, the results are generally consistent with that of the PMG in terms of connections.

Keywords : Bank Credit, Savings, Non-Performing Loan, Financial Profitability, Interest Rate

I. INTRODUCTION

The principal role banks play in a country is the distribution and allocation of economic resources. Banks ease the apportionment of possessions from savers to debtors of functioning should spawn sufficient income to shield this rate (Ongore & Kusa, 2013). Regardless of the recent trend of financial disintermediation and the progress in market-based finance, modern economies recognize the essential role performed by banks. Alternatively, Al-Tamimi & Hussein (2010) confirmed that both inner and outside factors can influence commercial banks' performance. The center factors are considered to have an undeviating effect on banks' performance and act as a transitional. Also, Dietrich & Wanzenried, (2011) clarified that for banks to achieve the intermediation role appropriately to shield their operating cost acquired in their process macroeconomic (external) which comprises factors such as IR, exchange rates, and inflation impact indirectly to banks performance. The inner decisions of the board and management of banks remain the bank-specific characteristics that result bank performance while the exterior factors are the industry-wide which are outside the power of the company and which can result on the productivity of the bank such as the macroeconomic variables. Furthermore, Ongore & Kusa (2013) identified in their study that ownership identity either foreign or local bank can influence bank performance.

Interest rate (IR) is the sole of the greatest significant features that have an impact on the financial performance of banks. Quah & Crowley (2010) described IR as the value a debtor recompenses for the usage of cash that is received from a creditor. Interest rates show a significant part in the development of markets and have a monetary organization or paid a fee on the borrowed money. Interest rate is also distinct as the quantity of interest outstanding as a quantity of the sum borrowed,

deposited, or borrowed straight affect the earnings on investments attainable from diverse financial tools. Corb (2012) also, asserted that one of the economic tools used to regulate inflation and enhancement economic development is IR. Mostly commercial banks' performance is predisposed by the fluctuations of interest rate, Mang'eli, (2012) claimed that the financial structure as the entire is infinitely aided relatively than the stalled growth of interest rates. Bragt, Francke, Kramer, & Pelsser, (2010) maintained that since the financial predicament of 2008 and the stock market decline that followed, IR has been maintained at extremely low levels by the USD Federal Reserves and that banks make a return on the change amid what they incur to borrow funds and the rate at which they on-lend the funds borrowed from depositors. The greatest current profitability measures are profit margin on sale, ROE and ROA ratios. Stated that a rise in request for credit is inversely connected to IR. When consumers miscarry to pay their credits on time, the quantity of credit accessible also declines (Kodongo & Ojah, 2012). An increase in IR is prompted by a surge in inflation and the purchasing authority of money decreases. Protected loans are obtainable at lesser IR compared to indiscreet loans. Additionally, when wage rates rise, interest rates also increase (Corb, 2012). IR spread has generated serious public debate in recent times in Ghana, as the gains of the micro-strength have not been translated into meaningfully deteriorating IR. According to Bawumia, Belnye, & Ofori, (2005), IR inside the Ghanaian monetary industry is among the greatest in Africa.

There are such huge numbers of hypothetical writing about IR on banks' performance, however for the persistence of this paper three speculations are pondered: orthodox theory of IR, loanable resources theory, and the rational anticipation theory of IR. The orthodox theory of IR is considered as the establishing fathers that proposed the idea of IR (Saushini & Sheefeni). Lopez, Rose, & Spiegel, (2018)

stated that the orthodox theory battles the amount of IR is strongminded by double powers. At first, arrangements of stores, coming about principally from families, and extra the offer for investable assets, approaching essentially from the trade territory (Lopez et al., 2018). Reserve funds compare venture which characterizes IR in the customary theory. Thusly, reserve funds and stock are consistently the equivalent and are accepted to be in the actuality of completely utilized in an economy by the conventionalists. Thusly, businesspeople will acquire in heading to go through with the customary condition at a lower measure of premium, and at a higher rate of premium, the more reserve funds will be made when IR likens investment funds and speculation. Henceforth, harmony is set up when market powers change the interest and supply of account holder finances when IR is driven at various dimensions. Saushini & Sheefeni (2019) fulfilled the number of stores is always comparable to stock and full income will continually continue as before to full consumption when IR is built up to be adaptable. Also, the loanable reserve theory clarified by Lopez et al., (2018) announced that this hypothesis is an improvement to the conventional thought, inferable from its expansion of commonly monetary and non-financial appearances of the dubious (Lopez et al., 2018). Differentiating the customary way of thinking, in the loanable store's approach of philosophy, the equipose IR interfaces the sum gave of loanable resources, which presenting to Roodman & Morduch, (2014) include of ventures, by the measure of loanable resources, which involve holds and vows supported by an administration shortage.

Basher, Haug, & Sadorsky (2012) kept up that the IR is strongminded by interest and supply for credit in this hypothesis. This proposes IR is the esteem that interfaces with the solicitation for indebted person reserves and the amount for loanable resources. On equipose level, any place the supplication for is identical to the hotspot for loanable resources,

singular banks, and business-account holder stand the gladdest possible, (Irungu, 2013). The loanable store's thought is more extensive than the conventional way of thinking. The loanable stock's hypothesis contemplates the IR similarly the motivation behind four markers: holds, resource, the desire to store cash, and measure of cash. Romer & Romer (2000) explained the same desire hypothesis of IR, on a monetary thought that money-related middle people make choices focused on their normal perspective. To make a relevant expectation about what's to come is the sound likelihood speculation that hypothesizes that individuals utilize all available data. Irungu (2013) declared that the way of thinking of normal desire hypothesizes that the best appraisal for the future IR remains the present difficulty and that varieties in IR stand mainly extraordinary to unanticipated certainties as well as varieties in rewarding viewpoints. Likewise, Goodhart (2009) articulated that, if individuals expect that IR will build, a few people will avoid obtaining, henceforth this activity upset bank productiveness owed to diminish wages on loan costs, rather, if people envision IR to fall they will be anxious to acquire and this drive extend banks productiveness attributable to heightening in IR profit.

Over the earlier years, there are various writing that has been understudy on the financial profitability of the financial sector among various nations over the world by applying diverse quantifiable factors to decide the interest rate. In Greece, Busch & Memmel, (2016) studied careful research on the deciding element of IR and they utilized the procedure of panel estimation strategy to look at their outcome. Their examination demonstrated that the crediting rate is regularly affected by the offer, size of the bank, and little evaluation by non-performing advances and testimony rates. Additionally, a comparative report directed in Czech by Hainz, Horvath, & Hlaváček, (2014), by utilizing information on a month-to-month reason researched the determinants of IR. The

investigation utilized a unit root test approach and board information for the estimation of bank point-by-point highlights, for example, credit-to-resource extent, capital, and benefit impact the spread degree. In the area of Kenya, Irungu, (2013) directed a concentrated to decide the presentation and the impact of IR spread in the different banks. The investigation built up that there is a decent association in the middle of the IR and FP of business banks. Thinking to the examination, the spread of IR distressed execution assets in the trade as it extends the charged cost on credits on the indebted person's then IR mandate had a significant effect on non-execution assets. The paper recommended that order on IR be secured by control of the administration on business banks. Likewise, Lukas & Ferrell, (2000) directed an investigation on a comparative work in Kenya, whose investigation was on the IR consequences for the productiveness of the speculation fragment and his decision after the examination was that the exhibition of gainful banks in Kenya stays influenced by IR to a huge degree both utilizing direct and second-hand information during their investigation by the use of the OLS estimation system. In this manner, Sheriff & Amoako, (2014), likewise directed an examination on four macroeconomics factors to get to its impacts on financing cost with the target of deciding the future and current relationship by applying vector blunder revision (VEC) cointegration and an auto-backward circulated slack (ARDL) for the included factors; capital bills bit, open portion obtaining choice, rate of swelling and the all out venture territory credits. Their outcome presumed that future and current pattern has a current association in the center of IR and macroeconomic factors in Ghana. Besides, Samahiya & Kaakunga (2014), likewise led an examination in Namibia on IR spread on components of business banks using a board information investigation of banks. They utilized the OLS technique to arrange bank-explicit factors over time that influenced the spread of loan cost. Their outcome

showed that liquidity levels, working expense and piece of the pie in Namibia were the best bank-explicit factor of spread on IR.

The above articles for the most part researched the effect of interest rate on the financial profitability of banks utilizing various estimation factors just as various districts together with various techniques. As recorded by Sheriff & Amoako, (2014), restricted examinations have explored both the components of high IR spread and the repercussions on both the nation and bank gainfulness through the fact that the standard of these investigations has been in different districts and nations. A percentage of the essential elements of moneymaking banks benefit incorporate IR spread which is among the few investigations. From the Ghanaian point of view, the examination of IR yields into the record the determinants from various discernments and various factors to quantify IR. As for Bawumia et al., (2005), the paper examined the elements of IR spread from the view of the market and business highlights while Sheriff and Amoako (2014) tried the variables of IR spread in Ghana focused on macroeconomic elements. This paper contrasted with the previously mentioned examinations utilized a bank-explicit variable to quantify FP, for example, (SV, BC, NPL, and INT) for the antiquated researched the effect of IR on FP dependent on panel PMG approach. The Panel PMG estimator has various advantages in correlation with other econometric strategies. For example, Panel PMG estimator through the ARDL strategy in any case of whether the indicators are consolidated of definitive $I(0)$ or $I(1)$, the prolonged-term and present-term approximations can be acquired notwithstanding of whether the event of cointegration is not authoritatively spotted and well gives powerful outcome in the incident of heterogeneous panels. Further, the Pooled Mean Group encapsulation is a panel blunder alteration perfect through short-keep running just as prolonged run assets anticipated together with an ARDL perfect

with the short-run result being permitted to vary through countries. Additionally, however there exist a significant number of looks into analyzing the effect of IR on FP, those using the panel case frequently utilize econometric techniques that expect or potentially cross-sectional freedom as well as heterogeneity. Depending on cross-sectional freedom and homogeneity alone is required to create misleading outcomes if the panel being utilized is cross-sectional dependent and heterogamous. In this way not at all like different examinations, we utilize a homogeneity test by Pesaran & Yamagata (2008) just as a cross-sectional dependence test by Pesaran (2004) to insist that the panel times arrangement information occupied with this investigation has cross-sectional connectedness and also heterogeneous. The examination in this manner contrasted with the previously mentioned looks into applies panel estimation techniques that exceptionally proficient and energetic to the event of cross-sectional reliance and heterogeneity.

II. Data and Econometric Methods

In this examination, the common association among financial profitability, bank credit, savings, Non-performing loan, and interest rates among country banks in Africa dated 2000-2016 years were broken down utilizing panel information strategies. To begin with, the direction of stationary factors was affirmed. At that point, a panel co-integration calculation set up by Pedroni and Kao was utilized to direct whether a prolonged association existed among the factors under study, in which FP stayed endogenous variable and (bank credit, savings, Non-performing loan, and interest rate) were exogenous factors. Also, a panel causatives test built up by Dumitrescu & Hurlin (2012) decides if a causal association existed among the factors. Five factors were amalgamated in this paper. This paper utilizes a quantifiable system and utilizes secondary data sources from the World Bank indicators for the year 2000-2016 retro. The World

Bank requires all banks to distribute their reviewed budget report freely on a yearly premise. The measurements per each variable were changed over into accepted logarithm, subsequently to comprehend the parameter approximations as the flexibilities of the endogenous indicator (FP). Results from the data were generated utilizing EVIEWS 9.0 and STATA 13.0 together with SPSS 20.0. Table 1 gives the aggregate of the indicators while the striking estimations of the different indicators joined in the panel time-series information are presented in Table 2.

Table 1 Data set

Variable	Definition	Source
FP	Profitability measured by Return on Asset (ROA)	World Bank indicators
SAV	Savings	World Bank indicators
BC	Bank's credit	World Bank indicators
NPL	Non-performing Loan	World Bank indicators
INT	Interest rate	World Bank indicators

2.1 Descriptive statistics

This paper concurs a panel discernment that takes advantage of clearing together time series and cross-sectional estimations, the technique, therefore, struggles less from dispersing concerns and modifications for the difficulty of heterogeneity of the 13 country banks in Africa allocated for this investigation. In this way, the strategy is further illuminating and compelling as indicated by (Gujarati, 2007). Strong estimations are endorsed to manage the

idea of the kurtosis, and the Jarque-Bera (JB) test of the ordinarieness of the dispersion. Table 2 demonstrates the distinct indicators for the factors FP, BC, SV, NPL, and INT separately. Each variable as expressed before is changed over into a natural logarithm. Measurably, Table 2 uncovers that, for the recorded banks utilized in the examination, BC and SV overall have medium mean estimation of 4.381% and 2.133% with an average deviation of 0.301 and 2.186 individually, which are genuinely enormous contrasted with the mean and average deviation of FP (M=0.536, SD=0.801) and interest rate (M=1.361, SD=1.107). NPL similarly has the most elevated mean estimation of 14.895% with an average deviation of 0.823 correspondingly. SV with a high SD estimation of 2.186 influence FP of banks in Africa. Concerning

skewness, all of the factors were adversely slanted, complimenting to one side. In favor of kurtosis, the estimation of FP, BC, and INT are over the ordinary esteem demonstrating FP, BC, and INT shape is leptokurtic while the state of SV, NPL is mesokurtic since they have their separate kurtosis incentive to be roughly 3. For the most part, for an arrangement to be commonly conveyed, the skewness and kurtosis should around be 0 and 3 individually. Accordingly, the fundamental end of the shape measurements is that every one of these dispersions FP, BC, SAV, NPL, and INT cannot be confirmed to be commonly distributed. This is in line with the JB-test which delineates that, there is sufficient indication to reject the typicality null hypothesis for all the distribution.

Table 2 Descriptive statistics (data transformed in natural logarithm)

Statistic	FP	BC	SAV	NPL	INT
Mean	0.536	4.381	2.133	14.895	1.361
Median	0.669	4.375	2.264	2.151	1.719
Std. Dev.	0.801	0.301	2.186	0.823	1.107
Skewness	-1.863	-0.292	-0.796	-0.421	-1.568
Kurtosis	11.948	3.052	2.279	2.299	5.585
Jarque-Bera (JB)	865.259	3.165	28.171	11.076	152.190
Probability of JB	0.000	0.205	0.000	0.004	0.000
Observation	221	221	221	221	221

2.2 Correlation and multicollinearity analysis

The results from Table 3 demonstrate a graphical outline in the focus of the affirmed factors BC, SAV, NPL, and INT have a factual significant association with FP, the VIF and Tolerance value in the hub of

the arrangement of forecasters gives a varied variety of systems for assessing the difficult of

Multicollinearity in a various diagnostics. Multicollinearity is a tainting of any of the desires for relapse investigation. Dormann et al., (2013) proposed

a technique for diagnosing and distinguishing Multicollinearity. A resistance estimation of a measure of 0.10 or 0.20 which is identical to a VIF of 5 or 10, p value > 0.05 , and the pair-wise connection appearing straight reliance of 0.90 or more. The outcomes uncover that the VIF for indicators BC, SAV, NPL, and INT intelligent us that the fluctuation of the normal variables is amazingly swelled and exceedingly associated with at any rate in the model. To test for multicollinearity among the variables (financial profitability, bank credit, savings, Non-performing loan, and interest rates), the Tolerance together with the Variance Inflation Factors (VIF) per each variable is estimated. Table 3 indicates that there

is no existence of multicollinearity among the explanatory variables since the Tolerance values are not less than 0.2 and VIF values are far less than 5. This, therefore, implies that the aforementioned variables are independent of each other and hence can be considered as independent variables and assumed to affect financial profitability. The results indicate that BC has an earth-shattering moderate association with FP and impact negatively, but statistically significant at 1%, while a non-performing loan is correlated and impact negatively on FP at 1% level of significance. On the other hand non-performing loan interestingly is correlated and negatively impact BC at 1% statistically significant.

Table 3 Correlation and multicollinearity analysis

Variables		FP	BC	SAV	NPL	INT	TOL	VIF
FP	Pearson connection							
1			.939		1.065			
	Sig (2-tailed)							
BC	Pearson connection		-0.327***					
1		.983		1.017				
	Sig (2-tailed)		0.000					
SAV	Pearson connection		-0.147	-0.003				
1		.935	1.069					
	Sig (2-tailed)		-0.186	0.968				
NPL	Pearson connection		0.005 **	-0.243***	-0.010			
1		.977	1.024					
	Sig (2-tailed)		0.000	0.000	0.885			
INT	Pearson connection		0.082	-0.025	0.129	-0.069		
	Sig (2-tailed)		0.227	0.715	0.056	0.304		1

Note: Dependent variable is profitability, the Tolerance values are not less than 0.2 and VIF values are all less than 5, indicates there is no Multicollinearity.

2.3 Analytical Model

This investigation is to explore the impact of interest rates on the financial profitability of banks by including BC, SAV, NPL, and INT as measurement variables measuring IR to form a multivariate framework. These variables are generally proven to have a statistical momentous influence on the FP. Hence, our proposed model concerning the impact of IR take the following form:

$$FP = f(IR) \quad (1)$$

Where IR represents Interest rate and FP denotes financial profitability measured by ROA.

Since the indicator interest rate is measured using the measurement variables; bank credit, savings, Non-performing loan, and interest rate equation (1) is rewritten as;

$$FP = f(BC, SAV, NPL \text{ and } INT) \quad (2)$$

The connection from condition (2) demonstrates that financial profitability (FP) is a component of bank credit, savings, Non-performing loans, and interest rates. With the goal of econometric estimation and the information utilized being time-dependent which ranges from 2000 to 2016, formula (2) can be interpreted in the succeeding structure:

$$FP_t = \beta_0 + \beta_1 BC_t + \beta_2 SAV_t + \beta_3 NPL_t + \beta_4 INT_t + u_t \quad (3)$$

where t represents the time in years

Since the investigation exclusively focusses on panel information including a sample of 13 commercial banks between 2000 and 2016, condition (3) can further be written in a panel model structure as;

$$FP_{i,t} = \beta_0 + \beta_1 BC_{i,t} + \beta_2 SAV_{i,t} + \beta_3 NPL_{i,t} + \beta_4 INT_{i,t} + u_{i,t} \quad (4)$$

where i represents individual country banks.

To address issues of heteroscedasticity, each one of the factors incorporated into the proposed FP work in condition (4) is changed into a natural logarithm. The log-linear model used to investigate the impact of interest rate on the financial profitability of banks is formulated as;

$$\ln FP_{i,t} = \beta_0 + \beta_1 \ln BC_{i,t} + \beta_2 \ln SAV_{i,t} + \beta_3 \ln NPL_{i,t} + \beta_4 \ln INT_{i,t} + \varepsilon_{i,t} \quad (5)$$

where $\ln FP_{i,t}$, $\ln BC_{i,t}$, $\ln SAV$, $\ln NPL_{i,t}$, $\ln INT_{i,t}$ are the natural logarithms of bank credit, savings, Non-performing loan, and interest rate are the samples of individual country banks i at period t , and $\varepsilon_{i,t}$ represents the individual error terms.

2.4 Econometric methods

In demand to evaluate the impact of interest rate on FP of banks between 2000 and 2017, the difficulty of whether cross-sectional dependence exists in the core of the factors inside the panel must be tested. Cross-sectional reliance among factors inside a panel time-series information demonstrates the significance for the collection of development examinations to the investigation which incorporates panel unit root analyzes notwithstanding panel cointegration tests. This paper hence broke down the cross-sectional independence among the indicators with the Pesaran, (2004) CD test and Pesaran & Yamagata, (2008) CD_{LMadj} . After the cross-sectional reliance test, the paper far along examined the incorporation dimension of the indicators utilizing recent created panel unit root test by Pesaran (2007) which incorporates Cross-sectional CADF and CIPS tests. Having affirmed the cross-sectional conditions and non-stationary factors, the investigation went further to test the nearness of fundamental prolonged relationships among the indicators by the Pedroni cointegration test Pedroni (2004) and Westerlund-Edgerton bootstrap panel cointegration test likewise by (Westerlund & Edgerton, 2007b). The investigation, at last, utilized the Pooled Mean Group estimator through ARDL to decide both the long-term and short-term approximations of the hitherto declared factors utilized in the examination.

The panel ARDL prototype of late has stayed inferable from some significant points of interest it has over different models including (I) however the arrangement is lag I(1) or I(0), this model can position utilized and (ii) together with the present-term and extended-term approximations can be acquired in the meantime.

The $ARDL(p, q)$ involves lag p for the dependent indicator and lag q for the independent indicator. Generally, $ARDL(p, q)$ as endorsed by (Pesaran, Shin, & Smith, 1999) is given by the relation as follows;

$$y_{i,t} = \sum_{j=1}^p \mu_{ij} y_{i,t-j} + \sum_{j=0}^q \Omega'_{ij} x_{i,t-j} + \varepsilon_{i,t} \tag{6}$$

where $i = 1, 2, 3, \dots, N$ characterizes the number of individual banks applied in the study; $t = 1, 2, 3, \dots, T$ symbolizes the time in ages, y_{it} is the reaction indicator, x_{it-j} represents a $m \times n$ vector involving the accepted logarithm of the clarifying indicators, μ_{ij} is a scalar direction, Ω'_{ij} epitomizes the $m \times 1$ coefficient direction whereas ε_{it} is the error span with zipping mean and a predictable variance.

Taking into account an extreme lag of single for all the indicators (both dependent and independent variables), the ARDL (1, 1, 1, and 1) model from equation (6) is framed as;

$$y_{it} = \mu_{1i} y_{it-1} + \sum_{j=0}^1 \Omega'_{1j} x_{it-j} + \varepsilon_{it} \tag{7}$$

Equation (7) can be transcribed in error alteration formula as;

$$\Delta y_{it} = \psi_i (\Delta y_{it-1} - \Theta' x_{it}) + \sum_{j=1}^{p-1} \mu_{ij} \Delta y_{it-j} + \sum_{j=0}^{q-1} \Omega'^*_{ij} \Delta x_{it-j} + \varepsilon_{it} \tag{8}$$

where $\psi_i = -(1 - \sum_{j=1}^p \mu_{ij})$, and $\Theta = \frac{\sum_{j=0}^q \Omega_{ij}}{\psi_i}$.

Θ embodies the long term connotation between the response and explanatory factors (y_{it} and x_{it}) while Ω'^*_{ij} furthermore, present the term impact in x_{it} 's on the y_{it} 's. The ψ_i methods the modification length which is utilized from deciding the velocity of converging of the response factors in impacting to its long-run equilibrium as the explaining variable changes. ψ_i is predicted to be both undesirable and radical to demonstrate the reality of strength in the long-term relationship.

Per our paper, the adjusted prototypical with (FP) dignified using (ROA) as the reaction variable from equation (1) therefore, be formulated in the panel ARDL setup as;

$$\begin{aligned} \Delta FP_{i,t} = & k + \psi_i (\Delta FP_{i,t-1} - \Theta'_{1i} BC - \Theta'_{2i} SAV_{i,t} - \Theta'_{3i} NPL_{i,t} - \Theta'_{4i} INT_{i,t}) + \sum_{j=1}^{p-1} \mu_{ij} \Delta FP_{i,t-j} + \sum_{j=0}^{q-1} \Omega'^*_{1ij} \Delta BC_{i,t-j} \\ & + \sum_{j=0}^{q-1} \Omega'^*_{2ij} \Delta SAV_{i,t-j} + \sum_{j=0}^{q-1} \Omega'^*_{3ij} \Delta NPL_{i,t-j} + \sum_{j=0}^{q-1} \Omega'^*_{4ij} \Delta INT_{i,t-j} + \varepsilon_{it} \end{aligned} \tag{9}$$

Equation (9) is calculated by the PMG method as identified with different measures, the PMG has various preferences. For example, as far as possible the long-run approximations to be persevering transversely cross-areas with a panel enable the short-run estimations and changes following transversely among countries. Moreover, it may be cast off by the arrangement of lag I(1) or I(0), and extrapolation of long-term and short-run interconnections can be squeezed unfluctuating. However, the event of cointegration is not authoritatively distinguished. The PMG ARDL long-term and short-term measures are documented.

As prior detailed in numerous examinations, the affirmation of basic cointegration further infers the presence of causalities among the factors. The examination, subsequently, reports Granger Causality. Causality is a huge origination in the exact examination and indicates the limit of one variable to figure or impact the other. The Granger (1969) association system is built up to test for an interfacing relative. Presenting to

Granger, Y impacts X if the past estimation of Y can castoff to gauge X more precisely than simply debilitating the past guidelines of X. Subsequently, the criticalness of this examination is to direct the method for interconnection in the hub of two factors (X and Y) in the panel information. The thought past due to this examination is to run the succeeding bi-assortment relapse models if we need to choose the bearing of connectedness in the core of X and Y.

$$X_t = \gamma_0 + \sum_{i=1}^n \delta_i X_{t-1} + \sum_{j=1}^m \delta_j Y_{t-j} + \mu_{it} \tag{10}$$

$$Y_t = \alpha_0 + \sum_{i=1}^n \alpha_i X_{t-1} + \sum_{j=1}^m \beta_j Y_{t-j} + \mu_{2t} \tag{11}$$

wherever m and n are the number of lagged, X and Y remain the terms correspondingly, μ_{it} are the indiscriminate errors, equation (10) forecasts that are connected to past values of itself as well as that of equation (11) forecasts comparable movement for if we decide to check whether X causes Y or/and Y causes X we carry out F-test on the joint significance.

$$H_0: \sum_{i=1}^n \delta_j = 0 \text{ and } H_0 \sum_{i=1}^n \alpha_i = 0, \text{ respectively}$$

we reject, if the determinant k is the number of parameters evaluated in equation (10) and (11), n is the quantity of explanatory then we do not reject.

III. Empirical Results and Discussions

3.1 Cross-sectional independence test

Table 4 displays the findings centered on cross-sectional reliance checks. Using the deliberate values and their relevant P-values, we expectantly reject the null hypothesis of the slope coefficients being homogeneous at a degree of significance of 1%. This consequently means that heterogeneity exists for all the analyzed variables inside the banks, thus heterogeneous panel strategies wherein differ across sections in the panels have to be normal. In addition to the homogeneity test, Table 4 alternatively reviews findings from the CD test by referring to the CD test values and their corresponding probability values, it can be certified that both the CD_P -test and the CD_{LMadj} test are utilized to explore factors in other to investigate whether panel data have cross-section. The results from previously mentioned cross-sectional reliance evaluations are organized in Table 4, indicating to the associated probability values, the null hypothesis of cross-sectional dependence for BC, SAV, NPL, and INT is rejected. This, at that point, adds to the suggestion that the panel data which contains the assessed elements have a cross-sectional bias. Moreover, the valuation of the homogeneity test utilizing the Dogan & Seker, (2016b), discoveries uncover that the null hypothesis of homogeneity is rejected at a 1% critical level indicating that, the disposition sums are heterogeneous over every single cross-area. Consequently, this paper utilizes the CIPS and CADF panel unit root test in the resulting area to investigate the direction belongings of the components.

Table 4 results from the Cross-sectional independence test

Variables	Cross-sectional dependence test			
	CD_P -statistics	p-value	CD_{LMadj} test	p-value
FP	-0.240	0.810	3.980***	0.000
BC	-0.825	0.408	13.108***	0.000

SAV	4.983***	0.000	14.158***	0.000
NPL	5.262***	0.000	20.064***	0.000
INT	4.014***	0.000	0.562***	0.573

Note: *** exemplifies the rejection of the null hypothesis at a 1% significance. The CDP--the test of (Pesaran, 2004) and the CDLMadj test of (Pesaran & Yamagata, 2008) tests the invalid speculation cross-sectional dependence.

3.2 Panel unit root test

Conferring to Gengenbach, Palm, & Urbain (2009), as evaluated in the technique of this work, CIPS and CADF panel unit root tests are utilized instead of customary unit root tests, for example, Breitung, IPS, and LLC panel unit root examination. This is distributed to contend that the conventional panel unit root test has some inadequacy with reverence to the presence of cross-sectional dependence. More conspicuously, the CADF and CIPS unit root test produce steady results in the incident of cross-sectional dependence as buttressed by the consequences of (Dogan & Aslan, 2017). Outcomes of the CIPS and CADF examination are, therefore, expressed in Table 5. The evaluations exhibit that the components below exploration are not stationary at their first difference. Subsequently, this dips the sign that the components BC, SAV, NPL, and INT are altogether associated with a related decree of lag (I(1)).

Table 5 results from Panel unit root test

Variables	CADF				CIPS				Decision
	Levels		First difference		Levels		First difference		
	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	Constant	Constant and trend	
FP	-1.644	-2.013	-	-2.873**	-2.407	-3.048	-5.078***	-4.908***	I(1)
BC	-1.497	-2.052	-	-	-1.433	-1.433	-2.215**	-2.606**	I(1)
SAV	-2.247	-2.574	-	-	-1.950	-2.606	-4.334***	-4.298***	I(1)
NPL	-2.105	-2.199	-2.131**	-2.132***	-1.636	-1.771	-2.864***	-2.910***	I(1)
INT	-2.218	-2.445	-	3.612***	-3.260	-3.260	-4.982***	-5.088***	I(1)

Note *** and **, and * exemplifies the disavowal of the invalid hypothesis at 1% and 5% and 10% dimension of importance correspondingly. The CADF and CIPS board unit root examinations acknowledge the invalid speculation of non-stationary among the arrangement. I(1) assigns the street of the mix of the elements utilized in the examination.

3.3 Panel cointegration test

Table 6 classifies the discoveries in advancement to the Pedroni (2004) Panel Cointegration test. Among the seven statistics from the Pedroni panel cointegration test, four supported the rejection of the no cointegration null hypothesis. Inside this arrangement of four indicators, we build up Panel PP and Group PP-measurement just as Panel ADF and Panel ADF-statistic as progressively critical and reliable. Per the result in Table 6, the null hypothesis of no cointegration is rejected at 1% by Panel PP and Group PP statistics alongside Panel ADF and Group ADF statistics are rejected at 10%. We, therefore, conclude there exists a long-run connection in the focus of the variables under study.

Table 6 Outcomes from Pedroni (2004) and Kao cointegration statistics

Collective AR measurement (within-length)		
	Statistic	Weighted statistic
V-statistic	-1.875	-1.080
Rho-statistic	1.028	0.452
PP-statistic	- 4.469***	-5.801***
ADF-statistic	-1.286*	-1.498*
Individual AR coefficient (between-dimension)		
Rho-statistic	1.685	
PP-statistic	-8.566***	
ADF-statistic	-1.250*	
Kao cointegration test		
ADF	T-statistic	p-value
	-0.681	0.2477

From the outcomes of the Kao, cointegration examination showed in Table 6, the circumstance stays perceived that the analyzed components are cointegrated and progressively conceive Cointegration relations. The understudy is grounded on the evidence that there is an affirmation to reject the null hypothesis of no cointegration for the optional notion of cointegration. Also, the outcomes of the Pedroni and Kao portion cointegration examinations, we recoil on the assumption of cointegration in the analyzed elements utilized in the examination.

Despite the aftermath of the Pedroni and Kao Cointegration tests are productive and generally utilized in writing they have their shortcomings with regards to the existence of cross-sectional connections and heterogeneity. As per Dogan & Seker (2016b), the disappointment for a strategy for cointegration to have the option to address the hitches of cross-sectional dependence and heterogeneity to a relinquishment of adequacy in uncovering the occasion of a long-run among indicators. Consequently in checking for the superiority of the past results after the Pedroni and Kao Cointegration analysis separately. The investigation further utilized the Westerlund-Edgerton bootstrap cointegration test. This portion of the cointegration test is pondered to be a second-era cointegration test and takes with defense the hitches of cross-sectional conditions and heterogeneity. In mandate to utilize Pedroni, (1999), Kao, (1999), Westerlund & Edgerton (2007a) cointegration evaluations, there must not be a cross-sectional reliance in a prototypical. Although there is no cross-sectional reliance, succeeding panel cointegration checks considered by Westerlund & Edgerton (2007b)

panel cointegration by (Westerlund & Edgerton, 2007a) remained used in our investigation. The test can be castoff together in instances of cross-sectional reliance and freedom.

Table 7 Results from (Westerlund & Edgerton, 2007a)

Statistic	Value	p-value	robust p-vale
G_t	-1.590	0.941	0.415
G_a	-3.595	1.000	0.040
P_t	-7.878	0.169	0.118
P_a	-3.950	0.889	0.025

As articulated in the previous analysis, the bootstrap strategy stays utilized when there clarifies a cross-section dependence in the panel. In its need, asymptotic conventional dispersing is substantial. Presenting to the bootstrap strategy, together the statistics and the set are factually insignificant. Rendering to the asymptotic common spread, both the segment and the set measurements are factually enormous. Subsequently, the unacceptable notion of no cointegration is rejected in asymptotic however it is not rejected in the bootstrap strategy. In our model, the consequence of the asymptotic customary scattering is taken into worry since there is no cross-sectional dependence. In this unique circumstance, we can bait a choice that there is a cointegration in our model and BC, SAV, NPL, and INT are interrelated in the long term.

3.4 Pooled Mean Group (PMG) estimation

After recognizing that the indicators are cointegrated for all banks, it is interfered to estimate the long term and the short period of estimates by the PMG ARDL evaluation model to explore the associations between the indicators. Table 8 displays the relationship of the central assumptions of the PMG estimation technique. The detailed discussion below.

3.4.1 PMG estimation results for all commercial banks

Table 8 reports the PMG estimation results for the panel containing all the banks where the long and short period coefficients are based on the elasticity coefficient for financial profitability (FP) to the evaluated variables. All the variables except interest rates were identified to have a positive and insignificant impact on FP in the long run. All things being equal a 1% increase in bank credit, savings, and non-performing loans increases FP by 0.58%, 0.067%, and 0.29%, respectively. In regards to the FP relationship, a bi-causal connection exists between bank credit and FP, which is evidenced in both the long term and short term. Furthermore, when we look at the causal link between NPLs and BC, a uni-causality extends from the latter (BC) to the former (NPLs) in the long-term and short-term. Also, a one-way causality is found in both long-term and short-term running from interest rate and BC, suggesting that country banks in African will benefit more from bank credit. The addition of these variables is an imperative contribution of this research to alleviate the issues of business to omitted variables. Mainly, the importance of the aforementioned variables as long-term elasticity coefficients which are less in the short-term indicates their significance in explaining the dynamics to the link amongst financial profitability in

the long term. Specifically, from the PMG estimation results, the variables BC, SAV, and INTR are very significant, corresponding to the adjustment years respectively, indicating that each variable responds speedily to deviances in long-term equilibrium. The Hausman test ultimately shows that it is impossible to reject the homogenous constraint in long-term equilibrium at a 1% level of significance, meaning the PMG estimator is suitable and effective for the estimation of the pooling long-term coefficients.

Table 8. Results from PMG estimation for all commercial banks

Dependent Variable	Coeff.	P-value	BC	SAV	NPL	INT
Long-run Coef						
FP						
BC	-0.589***	0.000	-0.589***	-0.589***	-0.589***	-0.589***
SAV	-0.064***	0.000		-0.589***	-0.589***	-0.589***
NPL	0.297***	0.000			0.297***	0.297***
INT	0.006	0.894				0.006
Short-run Coef						
ECT	-0.787***	0.000				
BC	5.206	0.034	5.206*	5.206	5.206	5.206
SAV	-0.113	0.587		-0.113	-0.113	-0.113
NPL	-0.141	0.181			-0.141	-0.141
INT	0.042	0.412				0.042
Hausman						
P-value					0.179	0.413
			0.842			0.412

Note: ***, **, * indicate statistical significant at 1%, 5% and 10% respectively.

3.4.2 PMG estimation results for Individual commercial banks

Table 9 gives the PMG estimation results for the panel containing the individual banks where the long-term and short-term coefficients are based on the elasticity coefficient for the dependent indicator financial profitability (FP) for the analyzed variables. All the variables except interest rates were identified to have a positive and insignificant impact on FP. Our study contrast with the work of Nawaz, Shakoor, & Pirzada (2013) who found that in Pakistan there was a strong and positive correlation between the interest rate and commercial bank's profitability meaning that if the value of interest increased/decreased then as a result, the value of bank profitability also increased/decreased. This result from our work is consistent with the work of Koehn & Santomero (1980), Lopez et al., (2018) who found a positive relationship between the level of interest rates and the slope of the yield curve on the one hand, and bank profitability on the other. Additional studies that had a similar outcome include those of Ogbenjuwa, (2016) in Nigeria Haron (2004) who studied determinants of profitability of Islamic banks.

Regarding Table 9, the elasticities of FP relative to all variables included in the examination are significant in the long-term at a 1% level. This result depicts that, all things being equal, a percentage increase in bank credit, savings, and Non-performing loans give rise to FP by individual banks by 0.58%, 0.06%, and 0.29% respectively while bank credit and savings impact negatively to FP. Based on the granger causal relationship in Table 9, a two-way causality flanked by bank credit and FP is established for some country commercial banks in the long and short terms. Similarly, uni-directional causality was found amid Non-performing loans and bank credit in the long and short-terms. Also there the study reported a uni-directional causality between interest rate and bank credit. The results of this study lastly recorded uni-directional causation between non-performing loans and savings in the long term and short term. The findings per the PMG estimation further depict that, for the country (Id_1) there is a positive one-way cause-and-effect link in the short-terms. For the short-run estimates for the individual country that make up the panel, the error variances in the long-term are corrected by 0.95%, 0.98%, 1.27%, 1.49%, 0.79%, respectively at the adjustment speed. The error variances are not the same for each country in the panel.

Hypothesis	Obs.	F-statistics	P values	Decision	Type of Causality
BCR→PROF	208	10.495***	0.001	Reject	Bi-causality
PROF→BCR		11.309***	0.00	Reject	
				Fail to reject	No-causality
SAV→PROF	208	1.84419	0.176	Fail to reject	No-causality
PROF→SAV		0.005	0.941	Fail to reject	
				Fail to reject	No-causality
NPL→PROF	208	1.47507	0.225	Fail to reject	No-causality
PRO→NPL		1.485	0.224	Fail to reject	
				Fail to reject	No-causality
INTRE→PROF	208	0.242	0.623	Fail to reject	No-causality
PRO →INTER		0.001	0.967	Fail to reject	
				Fail to reject	No-causality
SAV→BCR	208	0.189	0.663	Fail to reject	Uni-causality
BCR→SAV		0.434	0.511	Reject	
				Reject	Uni-causality
NPL→BCR	208	10.207***	0.002	Fail to reject	Uni-causality
BCR→NPL		0.040	0.840	Reject	
				Reject	Uni-causality
INTRE→BCR	208	7.851***	0.005	Fail to reject	No-causality
BCR→INTER		0.574	0.449	Fail to reject	
				Fail to reject	No-causality
INTRE →SAV	208	0.096	0.758		

SAV→INTER		0.000	0.985	reject	
				Fail to	
				reject	
				Fail to	No-causality
				reject	
INTRE→NPL		0.176	0.675	Fail to	
NPL→INTER	208	0.547	0.460	reject	
				Reject	Uni-causality
NPL→SAV		4.870*	0.028	Fail to	
SAV→NPL	208	0.735	0.399	reject	

Note: **, * indicates rejection of Granger causality at 5% and 10% statistical significance respectively

Relatively, the PMG estimator is such that the long-run coefficient is the same across all the groups that make up the panel. Interestingly, bank credit harms financial profitability at 1% statistically significant, savings impact negatively on financial profitability at a 1% level of significant and non-performing loan impact on FP. The PMG estimator assumes that it considers the variables making up the panels to be homogenous. According to the estimation results from the PMG estimator, all the error correction terms (ECTs) for the analyzed variables had the expected signs and also statistically significant at a level of 1% in the long term. Also, the Hausman test confirms that the PMG estimator is efficient in estimating the various parameters for the analyzed variables since the homogeneous constraints in the long-run equilibrium failed to be rejected at the 1% significance level.

In addition to testing the robustness of the PMG estimator, the panel vector error correction technique (PVECM) Granger causality tests were applied. Despite the differences in the parameter estimates (coefficients), the estimated results for the causalities among financial profitability, bank credit, savings, non-performing loan, and interest rates are generally consistent with the outcome of the PMG estimator using the ARDL model. This, therefore, indicates that the results from the PMG estimator concerning the causalities among the above-mentioned variables are robust and accurate. The results of the Grange connectedness test for each sample are presented in Table 10.

Table 10 results of the PMG estimates of individual commercial banks

Dependent Variable	Coeff.	P-value
Long-run Coef		
BC	-0.589***	0.000
SAV	-0.064***	0.000
NPL	0.297***	0.000
INT	0.006	0.894
	ECT	P-value
Short-Run Coeff(country)		
Id_1	.9537***	0.000
Id_2	.9868***	0.001
Id_3	1.278***	0.000
Id_4	1.318***	0.000

Id_5	1.494***	0.000
Id_6	1.485***	0.000
Id_7	.795***	0.000
Id_8	1.072***	0.002
Id_9	.878**	0.015
Id_10	.8686**	0.017
Id_11	.795***	0.000
Id_12	1.918***	0.000
Id_13	.753***	0.001

Note: Id represents individual commercial banks in the panel. ***, **, * indicate statistical significant at 1%, 5% and 10% respectively.

Discussion

To investigate the impact of interest rate as the power of growth on financial profitability for a panel of 13 country banks in Africa, a presentation of the Pesaran-Yamagata homogeneity test and Pesaran CD test disclosed the existence of heterogeneity and cross-sectional dependence among the analyzed variables. The presence of cross-sectional dependence and heterogeneity implies that changes concerning the variable of concern in one country are likely to affect a similar variable in other countries. Our findings per the existence of slope heterogeneity and cross-sectional dependence are generally in line with that of Dogan & Aslan, (2017). The application of CADF and CIPS panel unit root test further showed that the analyzed variables in all panels are integrated of the same order (I(1)) in other words stationery. As it is important to work with stationary variables in time series regression models, this study ensured stationary variables are used in the estimation. Econometrically, working with stationary variables avoids producing spurious results. This is in agreement with findings of Dogan & Aslan (2017), a study in EU countries, Dogan & Seker, (2016a) in OECD countries who employed the CADF and CIPS as well as Asafu-Adjaye, Byrne, & Alvarez, (2016) and Eggoh, Bangaké, & Rault, (2011) who only applied CIPS unit root test in the context of global and African countries respectively.

For examining the short and long-run causal dynamics amid the discussed variables as well as their respective estimates the PMG panel ARDL approach was utilized. Results from the long-run estimates revealed that bank credit harms financial profitability at 1% statistically significant, savings impact negatively on financial profitability at a 1% level of significance, and non-performing loans impact negatively on FP. This suggests, that, these variables are among the main drivers of economic growth in Africa. This result confirms several studies including one carried by Ugoani (2016) who found out that NPLs harmed the bank of Bangladesh. The outcome also concurs with Trivedi, (2015) who found out that NPLs are one of the major factors influencing banks' profitability which has a statistically significant negative effect on the net profit margin of listed banks in Dhaka. The results further agree with (Musah, Anokye, & Gakpetor, (2018) who found that NPLs adversely affect the performance of banks in Kenya. Additionally, the results confirm the study by Peng-fei, (2003) who found that NPLs had a significant effect on ROA in European banks. In all, the NPLs rate is the major indicator of commercial banks' credit performance. It is the ratio of NPL to total loan and advance which measures the extent of the credit risk of banks. In this case, the bank is exposed to risk when the NPLs rate increases. In summary, the key variables (bank credit, savings, loans, and non-performing interest rates) during economic progress are regarded by economic influencers who bring effect on relationships in the short and long term commitment. These variables are made to be beneficial in the

economic process by changing the relationship with the state and different freedoms of the long and short term. Therefore, the analysis of why the change of these indicators into engagement with the long and short term; First, the variance of the effects indicators rose more flexible which marks the difference in the long and short term. These indicators are rather very important in strength and therefore absorb a lot because of the sustained dynamic consistency in banks. For example, bank credit will increase the effectiveness of short-term bank environments of the economy and the long term.

IV. Conclusion and Policy Recommendations

This study considered the impact of interest rate as the power of growth on financial profitability and examine the causal link amid the measurement variables (bank credit, savings, non-performing loans, and interest rate) between 2000 and 2016. The countries used in this study were investigated as a whole panel and individually per country. First, considering the results from homogeneity assessment and Pesaran CD's checks, we detect the presence of heterogeneity and cross-sectional correlations for the explored data. Second, the CADF and CIPS panel unit root tests report that the variables are non-stationary at their stages but become stationary at their first transformations. Third, the Westerlund-Edgerton panel bootstrap cointegration test shows that the variables are cointegrated and hence possess a structural long-run relationship. Forth, results from the PMG estimator through the panel ARDL model show that; (1) A two-way connectedness is verge by bank credit and FP in the long-period short-period; (2) A positive and significant one-way cause running from NPLs to BC, a one-way cause amid interest rate and bank credit and lastly one-way causality only in the long-period for NPLs and SAV are evidenced; (3) The PMG estimator through the panel ARDL framework is evidenced to be very significantly effective to the application of Granger causatives test. Though different parameter estimates are evidenced, the results are generally consistent with that of the PMG in terms of connections. Empirical judgments of this study provide more facts to understand the connection in the middle of the variables examined and also help policymakers design policies based on

indicators studied. These empirical results deliberate policy recommendations in a step by step method as follows;

- (1) First, short-term and long-term causalities from the PMG estimation through the ARDL model discovered a two-way connectedness is a verge by bank credit and FP in the long-period short-period. This depicts that, bank credit and FP are connected, an increase in BC leads to a rise in FP, and whiles the increase in FP indicates a positive increase in BC. Thus as profitability increases, policymakers in Africa should develop a measure to make BC policies very actual and precise.
- (2) A positive and significant one-way cause running from NPLs to BC, a one-way cause amid interest rate and bank credit, and lastly one-way causality only in the long period for NPLs and SAV are evidenced.
- (3) The PMG assessment through the panel ARDL framework is evidenced to be very significantly effective in the application of the Granger causatives test. Though different parameter estimates are evidenced, the results are generally consistent with that of the PMG in terms of connections.

Finally, banks should consider the tender of best policy ethics, which have been the focus of collective consideration in the field of distribution of interest rates in recent years, principally owing to political insufficient rules which remain an essential source in the banking sector. The central objective of real interest rate policy is to reach the adjusted ratio of risk for banks, interest rate spread within acceptable

limits. Besides, banks must manage the rules of the entire interest rate policy and the risks associated with individual credit transactions, taking into account the study variables that have a long-term and short-term perilous link.

V. REFERENCES

- [1]. Al-Tamimi, H., & Hussein, A. (2010). Factors influencing performance of the UAE Islamic and conventional national banks. *Global Journal of Business Research*, 4(2), 1-9.
- [2]. Asafu-Adjaye, J., Byrne, D., & Alvarez, M. (2016). Economic growth, fossil fuel and non-fossil consumption: A Pooled Mean Group analysis using proxies for capital. *Energy economics*, 60, 345-356.
- [3]. Basher, S. A., Haug, A. A., & Sadorsky, P. (2012). Oil prices, exchange rates and emerging stock markets. *Energy economics*, 34(1), 227-240.
- [4]. Bawumia, M., Belnye, F., & Ofori, M. E. (2005). The determination of bank interest spreads in Ghana: An empirical analysis of panel data. *African Development Review*, 20(3), 378-399.
- [5]. Bragt, D. v., Francke, M., Kramer, B., & Pelsser, A. (2010). Risk-neutral valuation of real estate derivatives. ORTEC Technical Paper(2009-02).
- [6]. Busch, R., & Memmel, C. (2016). Quantifying the components of the banks' net interest margin. *Financial Markets and Portfolio Management*, 30(4), 371-396.
- [7]. Corb, H. (2012). Interest rate swaps and other derivatives: Columbia University Press.
- [8]. Dietrich, A., & Wanzenried, G. (2011). Determinants of bank profitability before and during the crisis: Evidence from Switzerland. *Journal of International Financial Markets, Institutions and Money*, 21(3), 307-327.
- [9]. Dogan, E., & Aslan, A. (2017). Exploring the relationship among CO2 emissions, real GDP, energy consumption and tourism in the EU and candidate countries: Evidence from panel models robust to heterogeneity and cross-sectional dependence. *Renewable and Sustainable Energy Reviews*, 77, 239-245.
- [10]. Dogan, E., & Seker, F. (2016a). The influence of real output, renewable and non-renewable energy, trade and financial development on carbon emissions in the top renewable energy countries. *Renewable and Sustainable Energy Reviews*, 60, 1074-1085.
- [11]. Dogan, E., & Seker, F. (2016b). An investigation on the determinants of carbon emissions for OECD countries: empirical evidence from panel models robust to heterogeneity and cross-sectional dependence. *Environmental Science and Pollution Research*, 23(14), 14646-14655.
- [12]. Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., . . . Leitão, P. J. (2013). Collinearity: a review of methods to deal with it and a simulation study evaluating their performance. *Ecography*, 36(1), 27-46.
- [13]. Dumitrescu, E.-I., & Hurlin, C. (2012). Testing for Granger non-causality in heterogeneous panels. *Economic modelling*, 29(4), 1450-1460.
- [14]. Eggoh, J. C., Bangaké, C., & Rault, C. (2011). Energy consumption and economic growth revisited in African countries. *Energy Policy*, 39(11), 7408-7421.
- [15]. Gengenbach, C., Palm, F. C., & Urbain, J.-P. (2009). Panel unit root tests in the presence of cross-sectional dependencies: Comparison and implications for modelling. *Econometric Reviews*, 29(2), 111-145.
- [16]. Goodhart, C. (2009). The interest rate conditioning assumption. *International Journal of Central Banking*, 5(2), 85-108.
- [17]. Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424-438.

- [18]. Gujarati, D. N. (2007). *Sangeetha (2007) Basic Econometrics*. Tata McGraw Hill Publishing Company Limited, New Delhi, 110(008), 451-452.
- [19]. Hainz, C., Horvath, R., & Hlaváček, M. (2014). The interest rate spreads in the Czech Republic: Different loans, different determinants? *Economic Systems*, 38(1), 43-54.
- [20]. Haron, S. (2004). Determinants of Islamic bank profitability. *Global Journal of Finance and Economics*, 1(1), 11-33.
- [21]. International Monetary Fund (2019). *International Financial Statistics, Real Interest rate*. Retrieved from World Bank, World Development Indicators, <https://data.worldbank.org/indicator/FR.INR.RINR?view=chart>, September 20, 2019
- [22]. Irungu, P. N. (2013). The effect of interest rate spread on financial performance of commercial banks in Kenya. Unpublished Master's Thesis). University of Nairobi, Nairobi, Kenya.
- [23]. Kao, C. (1999). Spurious regression and residual-based tests for cointegration in panel data. *Journal of Econometrics*, 90(1), 1-44.
- [24]. Kodongo, O., & Ojah, K. (2012). The dynamic relation between foreign exchange rates and international portfolio flows: Evidence from Africa's capital markets. *International Review of Economics & Finance*, 24, 71-87.
- [25]. Koehn, M., & Santomero, A. M. (1980). Regulation of bank capital and portfolio risk. *The journal of finance*, 35(5), 1235-1244.
- [26]. Lopez, J. A., Rose, A. K., & Spiegel, M. M. (2018). Why have negative nominal interest rates had such a small effect on bank performance? cross country evidence: National Bureau of Economic Research.
- [27]. Lukas, B. A., & Ferrell, O. C. (2000). The effect of market orientation on product innovation. *Journal of the academy of marketing science*, 28(2), 239-247.
- [28]. Mang'eli, M. (2012). Relationship between interest rate spread and financial performance of the commercial banks in Kenya. Unpublished MBA project, University of Nairobi, Kenya.
- [29]. Musah, A., Anokye, F. K., & Gakpetor, E. D. (2018). The Impact of Interest Rate Spread On Bank Profitability In Ghana. *European Journal of*
- [30]. Nawaz, M., Shakoor, M. I., & Pirzada, S. S. (2013). The professional development of employees in banks of Pakistan: A comparative study of public and private banks in Punjab Pakistan. *International Journal of Learning and Development*, 3(5), 89-110.
- [31]. Ogbenjuwa, E. I. (2016). Implementation of International Financial Reporting Standards by listed companies in Nigeria.
- [32]. Ongore, V. O., & Kusa, G. B. (2013). Determinants of financial performance of commercial banks in Kenya. *International journal of economics and financial issues*, 3(1), 237-252.
- [33]. Pedroni, P. (1999). Critical values for cointegration tests in heterogeneous panels with multiple regressors. *Oxford Bulletin of Economics and statistics*, 61(S1), 653-670.
- [34]. Pedroni, P. (2004). Panel cointegration: asymptotic and finite sample properties of pooled time series tests with an application to the PPP hypothesis. *Econometric theory*, 20(3), 597-625.
- [35]. Peng-fei, W. C. Z. (2003). An Empirical Analysis on Economies of Scale and Scope in China Commercial Banks [J]. *China Industrial Economy*, 10.
- [36]. Pesaran, M. H. (2004). General diagnostic tests for cross section dependence in panels.
- [37]. Pesaran, M. H. (2007). A simple panel unit root test in the presence of cross-section dependence. *Journal of applied econometrics*, 22(2), 265-312.

- [38]. Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621-634.
- [39]. Pesaran, M. H., & Yamagata, T. (2008). Testing slope homogeneity in large panels. *Journal of Econometrics*, 142(1), 50-93.
- [40]. Quah, C. H., & Crowley, P. M. (2010). Monetary integration in East Asia: A hierarchical clustering approach. *International finance*, 13(2), 283-309.
- [41]. Romer, C. D., & Romer, D. H. (2000). Federal Reserve information and the behavior of interest rates. *American Economic Review*, 90(3), 429-457.
- [42]. Roodman, D., & Morduch, J. (2014). The impact of microcredit on the poor in Bangladesh: Revisiting the evidence. *Journal of Development Studies*, 50(4), 583-604.
- [43]. Samahiya, M., & Kaakunga, E. (2014). Determinants of Commercial Banks' Interest Rate Spread in Namibia: An Econometric Exploration. *Botswana Journal of Economics*, 12(1), 1-10.
- [44]. Saushini, E. M., & Sheefeni, J. P. S. An Analysis of the Banking Sector Interest Rate Spread in Namibia.
- [45]. Sheriff, I., & Amoako, G. (2014). Macroeconomic determinants of interest rate spread in Ghana: Evidence from ARDL modelling approach. *Journal of Finance and Bank Management*, 2(2), 115-132.
- [46]. Trivedi, S. R. (2015). Banking innovations and new income streams: impact on banks' performance. *Vikalpa*, 40(1), 28-41.
- [47]. Ugoani, J. (2016). Nonperforming loans portfolio and its effect on bank profitability in Nigeria. *Independent Journal of Management & Production*, 7(2).
- [48]. Westerlund, J., & Edgerton, D. L. (2007a). New improved tests for cointegration with structural breaks. *Journal of time series Analysis*, 28(2), 188-224.
- [49]. Westerlund, J., & Edgerton, D. L. (2007b). A panel bootstrap cointegration test. *Economics letters*, 97(3), 185-190.
- [50]. World Bank (2019). Adjusted savings: net national savings (% of GNI). Retrieved from World Bank, World Development Indicators, <https://data.worldbank.org/indicator/NY.ADJ.NAT.GN.ZS>, September 20, 2019
- [51]. World Bank (2019). Bank Credit to Bank Deposits for all countries. Retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GFDD.SI.04>, September 20, 2019.
- [52]. World Bank (2019). Bank Non-Performing Loans to Gross Loans for all countries. Retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GFDD.SI.02>, September 20, 2019.
- [53]. World Bank (2019). Bank's Return on Assets for All countries. Retrieved from FRED, Federal Reserve Bank of St. Louis; <https://fred.stlouisfed.org/series/GFDD.EI.05>, September 20, 2019.

Cite this article as :

Emmanuel Kwaku Manu, Wen Xuezhou, Mary Akosuah Somuah, "Interest Rate Spread as the 'Power of Growth' on Financial Profitability of Banks in Africa", *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 8 Issue 2, pp. 312-332, March-April 2021. Available at doi : <https://doi.org/10.32628/IJSRSET218154> Journal URL : <https://ijsrset.com/IJSRSET218154>