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The Impact of bank-specific and macroeconomic variables on the profitability of banks from selected African countries

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Abstract
This was an empirical investigation of the impact of bank-specific and macroeconomic variables on the profitability of banks in selected countries in Africa, over the period 2009 to 2019. The study focused on 33 banks operating across 9 African countries, namely South Africa, Uganda, Kenya, Tunisia, Egypt, Namibia, Zambia, Nigeria and Ghana, as representative of the continent. The analyses of the various interrelations were done using the dynamic panel data modelling approach. The study used an unbalanced panel of commercial banks' data in the selected countries to estimate the model with both the return on equity and the return on assets as proxies for profitability. Of the bank-specific variables, net interest margin, loan loss and cost to income ratios have a statistically significant negative relationship with profitability. The relationship between non-performing loans, capital adequacy and profitability is statistically not significant. There is however, a positive and statistically significant relationship between profitability and macroeconomic-specific variables. Overall the study shows mixed impacts of bank-specific and macroeconomic variables on the profitability of banks in the selected countries in Africa, although they are at a different level of regulatory and supervisory regimes, including the pace of technological developments and implementation.

Key words: banks, regulations, profitability, risk profile, supervision, interrelations

Introduction

Banks are associated with playing a vital role in the economic growth of various countries. They provide liquidity and intermediation in the market and therefore are required to maintain a high level of solvency and liquidity. The work performed by Oloyede (1994) observed the susceptibility of the banks to the instability that arises from exogenous or endogenous shocks, and they are therefore acquiescent to regulation and supervision. The association of the profitability of banks and the business cycle is essential in the evaluation of the stability and soundness of the banking industry (Ali *et al.*, 2011*).* It is therefore, not surprising that many jurisdictions globally have financial systems that are based on the banking system.

In Africa, the reforms of the financial sector, in particular the banking sector reforms, took different forms prior to and after the 2008 to 2009 global financial crisis. These include an increase in regulatory requirements, recapitalisation, tightening the credit allocation requirements, deregulation, recapitalisation and restructuring of banks, interest and exchange rate liberalisation as well as restriction of external capital flows. The reasons for these reforms vary among countries, although they are mainly motivated by the need to create some stability within the financial system and reassure transparency in the banking system that is considered to be the backbone of the economy.

Profitability among banks is subjective to factors in both the macro and micro economic determinants in the form of banking regulations, policies and supervisory frameworks imposed by various regulators, supervisors, governments, and policymakers in countries across the world. The imposition of regulations, policies and supervision is an attempt by countries to protect their economies and individual depositors to banks (Caruana, 2015). It is encouraging that some theoretical work on quantifying the profitability of

banks is starting to emerge; however, the work is mainly on developed economies where the banking sector is deemed to be well developed in comparison to developing economies such as those in African countries.

The micro determinants could be termed the bank-specific determinants as they originate from the balance sheet and income statement of banks. The macro determinants of profitability reflect the economic and regulatory environment that impacts on the performance and operations of banks. There are various variables that were recommended to describe these classifications, in accordance with the purpose of each study. Central to the conclusions of these studies is that a large percentage of the banks' profitability is informed by bank-specific factors, although the macroeconomic factors affect the overall banks' performance (Athanasoglou *et al*., 2005).

Studies that deal with the bank-specific determinants of profitability tend to propose variables such as liquidity, quality of the bank's assets, size of the assets, management of the asset, capital, financial risk, to mention a few. The size of the assets of the bank relative to its profitability may be expected to be non-linear. Therefore this variable is expressed as the bank's logarithm of the bank's real assets and the square to capture the possibility on non-linear relationship (natural logarithm of the total assets of the bank). The study by Smirlock (1985) found that the size of the bank impacts positively on the profitability of the bank in general. The asset quality ratio is a proxy for the loan impairment charged annually as a percentage of the loan and advances to the clients of the bank. The impact of the ratio to the profitability of the bank is anticipated to be positive (Ali, 2016). This constitutes funds that customers place in the bank for safe keeping. Deposits are the "lifeblood" of banks, since they are mostly dependent on them for growing the business. Their impact on profitability should be positive. The ratio is measured as deposits divided by total assets. The capital adequacy ratio is a proxy that is used to determine the banks' ability to pay their liabilities in response to credit risk and operational risk. Central Banks set standards for the level of capital adequacy ratio required for banks. In addition, Bourke (1989) and Molyneux and Thornton (1992) found a positive relationship between better-quality management and profitability.

Macroeconomic determinants of the bank profitability could also be differentiated using variables such as inflation, gross domestic product, interest rates and any other variables that represent the market characteristics such as the market concentration, status of ownership and the size of the industry. According to Athanasoglou *et al. (2005)* , empirical studies on the bank profitability literature have focused mainly on a specific country, including the US (Berger, 1995; Angbazo, 1997), Greece (Mamatzakis and Remoundos, 2003; Kosmidou, 2006), Australia (Pasiouras *et al.*, 2006), Malaysia (Guru *et al.*, 1999), Colombia (Barajas *et al.*, 1999), Brazil (Afanasieff *et al.*, 2002) and Tunisia (Ben Naceur, 2003). Molyneux and Thorton (1992) were the first to investigate a multi-country setting by examining the determinants of bank profitability for a panel of European countries, followed by Abreu and Mendes (2001), Staikouras and Wood (2003), and Pasiouras and Kosmidou (2006). Other multi-country studies include Hassan and Bashir (2003), who examined profitability for a sample of Islamic banks from 21 countries; and Demirguc-Kunt and Huizinga (1999) who considered a comprehensive set of bank specific characteristics, as well as macroeconomic conditions, taxation, regulations, financial structure and legal indicators to examine the determinants of bank net interest margins in over 80 countries.

These studies used the bank-specific and macroeconomic variables to determine the profitability of banks. The outcome of the studies varied as the environments, data and periods of the studies differed. From the studies cited above, it is evident that more work is required, especially in developing economies to investigate the impact of internal and external variables on the profitability of banks on a multi-country setting. It is clear that there is limited research on the consequences of bank profitability, particularly in developing economies as in Africa. It is therefore, essential to understand the factors that influence banks' profitability in a panel of various countries with banks of different sizes operating at different jurisdictions.

Aim

The aim of this study is therefore to analyse the impact of the bank and macroeconomic-specific variables on the profitability of banks in selected countries in Africa. The study contributes by adding new features to the literature on the relationship between profitability and a pool of bank-specific and macroeconomic

variables across a variety of countries in Africa. It is therefore an objective of this paper to contribute in closing the gap as indicated on the focus of the available literature, while investigating the effect of the bank-specific and macroeconomic variables on the profitability of banks in the chosen countries.

Literature review

When the performance of banks and other financial institutions are conducted, it is mainly based on the analysis and assessment of how certain key indicators perform; indicators such as Return on Assets, Return on Equity, and other financial ratios. In addition, the macroeconomic environment in which banks operate affects the banks' performance.

Addullah, Parvez and Ayreen (2014) studied the factors that impact on the profitability of banks in Bangladesh, by exploring the determinants of profitability of 26 banks listed in the Dhaka Stock Exchange (DSE). The study categorised the determinants into three themes that are connected to the profitability of banks: those that are directly specific to the banks, the industry in general and the macroeconomic variables. The study used return on assets (ROA) and net interest margin (NIM) as a proxy for profitability, for reasons ranging from the assumptions that ROA explores the profits derived from the invested assets, whereas NIM is seen as the measure of the difference between interest revenues and interest costs. Their study concluded that overall the bank-specific variables appear to have a positive effect on the profitability of banks in Bangladesh whilst the industry and macroeconomic variables such as higher taxation, higher banking assets to gross domestic product (GDP) appear to decrease profitability.

The study contributes to the body of knowledge on the rare literature on determining the banks' profitability in emerging markets. The rarity of studies of this nature has been highlighted by other researchers such as Aysan and Gunes (2007), and Ali, Akhtar, and Ahmed (2011) whose studies on the profitability of banks in developing countries found challenges in finding relevant and "recent" literature. The trio's study was performed on commercial banks in Pakistan with data collected for a short period from 2006 to 2009. The objective of the study was to analyse the effect of public and private variables on the profitability of banks in Pakistan. The findings are similar to those found by Addullah, Parvez and Ayreen (2014) in Bangladesh, although their study was performed almost four years later. The study was performed under similar circumstances, with ROE and ROA used as measures of profitability.

Other earlier studies such as those on the internal factor analysis of the banking sector in Pakistan by Jayaid, Anwar, Zaman and Gafoor (2011) examined the profitability of 10 banks for a period of about four years with almost similar findings, although the proxy for profitability was the return on equity (ROE) and ROA. The study did not include industry variables, and likewise was performed over a short period and therefore places a dim light on the findings for reasons stipulated above.

This argument appears to be supported by a study by Akbas (2012) on the determinants of bank profitability on the Turkish banking sector by examining the impact of bank, industry and macroeconomic specific factors on the profitability of 26 commercial banks in Turkey over five years. This study found that the ratio of loan loss provisions to gross loans, the ratio of the total cost to total income, Herfindahl-Hirschman Index (HHI) for deposits and inflation, have statistical significance and a negative relationship with return on assets. Similar findings were true when the return on equity (ROE) was taken as a measure of profitability. The study followed the one previously done by Alper and Anbar (2011) where they examined bank and macroeconomic determinants of commercial bank profitability in Turkey. Theirs excluded the industry-specific determinants and the results were slightly different, although they also used ROA and ROE as proxies for profitability. The study, using a balanced panel dataset suggests that profitability in banks can be improved through increasing bank size and non – interest income.

El-Kassem (2017) investigated the main determinants of the profitability of six major lender banks using panel data from Qatar for the period 2008-2015. The study attempted to determine the effect of liquidity and risk variables on the explained variation of the bank's performance in Qatar. The study estimates the "return on average assets" (ROAA) as a function of independent variables that are liquidity and risk variables. It is not clear what the proxy of this variable represents, performance or profitability of banks in Qatar. It appears as if the two are used interchangeably, and therefore should be richer if the introduction of

a new variable and its representation is significantly explained to distinguish profitability and performance in banks. In its conclusion, the study findings refer to performance and fail to discuss any determinants of profitability as it highlighted that the variation of the independent variable "total capital ratio %" significantly affects the variation in performance of banks in Qatar measured by ROAA.

The study by Abedin and Dawan (2016) used a panel data analysis to estimate the profitability of the banking sector in Bangladesh. The study evaluated a panel of 29 banks using Panel Generalised Method of Moments (GMM) approach and random effect ordinary least squares (OLS) and found that loans and advances, human resources, efficiency and the growth of economic money supply have a positive impact on profitability whilst investment in government securities and shares has a significant negative impact.

From the literature review, it appears that there are several variables within the banks' financial statement that can be used as a proxy for Profitability. The internal variables that banks are utilising for determining profitability are the return on equity (ROE) that measures the rate of return that shareholders receive for investing their capital into banks. The return on assets (ROA) shows the efficiency of the management of banks in managing the assets of the bank into net earnings. Net Interest Margin (NIM) and Net Non-Interest Margin (NNIM) measures how the management of interest received from banks' activities such as deposits and borrowings is realized into net earnings. The latter deals with interest received from the non-banking activities of the bank. The literature appears not to delve much into the impact of risks that these variables are exposed against to realise the Profits such as the obvious inherent ones like credit and market risks. With the increase and fast-paced technological development and globalisation, operational risk has grown and its cost is significant in the determination of profitability in banks. Furthermore, regulators and policymakers appear to be concerned by developments in the sector and therefore impose new regulations – to the detriment of profitability in banks. Regulations are concerned when banks' credit exposures increase, which relate to the profile of the banks.

Methodology

Data description and collection

The study made use of secondary data to analyse and interpret the impact of bank-specific and macroeconomic variables on the profitability of banks in selected countries in Africa. Bank-specific data was collected mainly from Bankfocus and the macroeconomic variables dataset such as the real Gross Domestic Product (GDP) and inflation rate were collected from the World Development Indicators database (WDI) which is owned by the World Bank. The two datasets were pooled together in a panel dataset to be used in the estimation of the regression model.

Estimating the panel data methodology

The study built on the work performed by Athanasoglou *et al.* (2005) who examined the effects of bank-specific, industry specific and macroeconomic determinants of bank profitability in Greece. Their work applied dynamic panel model techniques to a panel of Greek banks that covered the period 1985 to 2001. This study used panel data regression to measure and analyse various interrelations using dynamic panel data modelling, cointegration, and error correlation modelling approaches. It used an unbalanced panel of commercial banks in the selected countries to estimate the model with both the return on equity and the return on assets as proxies for profitability. The study focused on 33 banks operating across 9 African countries, namely South Africa, Uganda, Kenya, Tunisia, Egypt, Namibia, Zambia, Nigeria and Ghana, as representative of the continent.

Before the panel data is estimated, the correct estimation model needs to be chosen. This involves the choice between the fixed effects and the random model. For the random effect model, each organisation's intercept is randomly drawn from a much larger population with a constant mean value whereas fixed effects models assume that the intercept may vary across organisations but each organisation's intercept does not vary over time (Rehman *et al.*, 2018).

Several tests can be performed to select the appropriate model for the panel. The most common tests used by researchers are the Chow test, Hausman test, and the Lagrange multiplier test (Hausman, 1978). For this

study, the Hausman test is used to eliminate the selection bias. Based on the findings of the Hausman test, the fixed-effect model is used in this study.

The fixed effects models used in this study are as follows:

$$ROE_{it} = \alpha_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 RGDP_{it} + \beta_4 Inflation_{it} + \beta_5 llr_{it} + \beta_6 nim_{it} + \beta_7 Cost\_to\_Income_{it} + \varepsilon_{it}$$

$$ROa_{it} = \alpha_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 GDP_{it} + \beta_4 Inflation_{it} + \beta_5 llr_{it} + \beta_6 nim_{it} + \beta_7 Cost\_to\_Income_{it} + \varepsilon_{it}$$

Where: i refers the banks in the sample (i=1, 2… 33 and t represents the time period t=2009 to 2019).

ROE represents the return on equity: ROE measures the efficiency of the management of the bank in using the resources of the bank (investments). ROE that determines the performance of banks is calculated as net income divided by total equity.

ROA represents the return on assets: ROA as a measure of profitability is a proxy for the capital variable (Ali, 2016). This constitutes the amount that is available to banks through the shareholders to support the business and therefore acts as a safety net in the case of possible bank failure. ROA is calculated by dividing the Net investment after tax by the average total assets of the bank.

CAR represents the capital adequacy ratio: The capital adequacy ratio is a proxy that is used to determine the banks' ability to pay their liabilities in the response to credit risk and operational risk. Central Banks set standards for the level of capital adequacy ratio required for banks. The ratio is calculated as follows: CAR = (Tier 1 Capital + Tier 2 Capital) / (Risk Weighted Assets).

NPL represents the non-performing loans: Non performing loans ratio articulates the quality of the portfolio of loans of the bank. The ratio is calculated as the non-performing loans as a percentage of the total loans advanced by the bank. This would express the quality of the credit exposed to the bank; therefore it is crucial for banks to screen credit policies as this could impact on the profile of the bank.

RGDP represents gross domestic product: The real gross domestic products (RGDP) will be used to proxy the macroeconomic activities of the countries under study. High GDP attracts investments in the country which could in turn be good for the business of the bank. A lower GDP could impact negatively on the bank's return and the portfolio of the banks.

Inflation: Inflation represents the change in the general price level of goods and services in the economy which affects ROA and ROE (Bilal *et al.,* 2013). It can impact the cost and revenues of banks. The interest rate can be adjusted to provide good returns on loans in instances where it is predicted appropriately. The literature defines the relationship between inflation and profitability as inconclusive. In this study, the inflation is proxied current inflation as calculated in the world development indicators database. Profitability can impact positively or negatively depending on whether the inflation is anticipated or unanticipated (Perry, 1992).

NIM represents the net interest margin: The competitive nature of banks is reflected by the development of the net interest margin. Constriction of margins as a result of competition weakens the competition of banks; therefore, banks could adopt a risky stance impacting on the quality of the business underwritten.

LLR represents the loan loss reserve: This ratio shows how the total loan portfolio of the bank is provided for and not charged off by the bank. It is expressed as the loan reserves as a percentage of the total loans advanced by the bank. The ratio impacts on the quality of the bank loan portfolio.

Cost to Income represents the loan to income ratio: The cost to income ratio is a measure of the cost of running the bank. To operate a bank, just like in many businesses, some expenses need to be catered for (such as hardware and software resources, salaries of human resources, etc.) as a percentage of income

generated before provisions. This ratio measures efficiency and can be affected/distorted by volatile trading income.

Prior to the simulation of the above fixed effects models, the descriptive statistical properties of the data are described, primarily focusing on the characteristics of the variables' descriptive statistics and correlations for the sample by presenting the respective means and medians, minimum and maximum values including the standard deviations. Following the presentation of the descriptive statistics, the data was transformed into a pooled panel in preparation for the application to the panel estimation method to discover the impacts of key variables on the profitability of banks for the period 2009 to 2019. The table below illustrates the descriptive statistical properties of the data.

Table 1: Descriptive Statistics

	ROE	**ROA**	**RGDP**	**NPL**	**NIM**	**LLR**	**INFLATION**	**COST_TO_INCOME**	**CAR**
Mean	3.114893	0.435155	0.805469	3.298962	6.885676	1.974874	7.557732	46.43509	5.170370
Median	0.286100	0.033600	0.053571	0.081200	7.150000	0.071300	0.116662	49.02900	0.174000
Maximum	40.66400	6.036000	6.671335	36.26200	19.45100	16.22800	145.5447	173.1870	26.00000
Minimum	-41.40600	-7.8277000	-1.616869	0.000000	0.017570	0.000000	0.000000	0.239250	0.000000
Std. Dev.	10.49472	1.495431	1.814002	7.530615	4.129649	3.899715	24.63816	26.37694	8.580097
Skewness	0.905233	0.239320	2.136119	2.763933	0.324136	2.129137	4.662613	0.631202	1.246445
Kurtosis	8.919685	12.06097	6.773876	10.24448	3.411361	6.574612	23.87796	6.328873	2.845824
Jarque-Bera	218.7459	469.9690	185.4875	474.0193	3.364921	176.4488	2984.596	72.35349	35.61014
Probability	0.000000	0.000000	0.000000	0.000000	0.185916	0.000000	0.000000	0.000000	0.000000
Sum	426.7403	59.61620	110.3493	451.9578	943.3375	270.5577	1035.409	6361.607	708.3407
Sum Sq. Dev.	14978.94	304.1388	447.5222	7712.582	2319.344	2068.258	82557.30	94621.03	10012.06
Observations	137	137	137	137	137	137	137	137	137

Table 1 presents the main descriptive statistics for both the explanatory and dependent variables for the study period (2009 to 2019). These are variables that were used in the estimation of the regression model for the study. The descriptive statistics are for comparison purposes and constitute the variables that have data available for the period of the study. The panel for the study is unbalanced and therefore some variables miss data in some banks in selected countries. For this study some missing values for cost to income ratio and net interest margin are observed in four countries (South Africa, Uganda, Zambia and Namibia). The variables were allocated/ modelled as they are reflected.

The return in equity (ROE) is at the lower end at 3.11% with a minimum of negative 41.41% and a maximum of 40.66%. This could indicate that there are banks that are badly managed with some that might have higher standards of managerial performance. The median at 0.29% might be a good indicator of the return in equity in this analysis as it is not impacted by high values on both sides of the continuum. The comforting aspect of this ratio is that it is, on average, positive.

The return on assets (ROA) is averaged at 0.44%, which is low but positive. It is an indication that banks in the selected countries finance assets that generate positive returns. The lower number indicates that there are banks operating in countries where they make huge returns and others operate in countries where it is difficult to generate a substantial return, if any. The maximum of 6.04% relative to the minimum of minus 7.83% confirms this contention.

The capital adequacy ratio is high at 5.17%, with a minimum of 0.00%. It reflects that banks are well capitalised, although there are banks' with the ratio under the Basel II requirement level of 8%. This reflects the heterogeneous way in which banks in Africa adopt the Basel framework and other international standards. It confirms the findings of the work done by Beck and Rojas-Suarez (2019) in which it was found that the implementation of Basel III in African countries is slow due to the diverse nature in the adoption of the standards. There are still banks in Africa that might not be fully complying with the Basel I and II frameworks and other international regulatory requirements. The regulatory and supervisory frameworks vary from country to country and where the banks are primarily licenced (where the head office resides) make a difference with regard to the regulatory and supervisory framework of banks. All banks operating in various countries and in different environments hold some capital, although it might be in the absence of regulations on capital requirements. With big and financially stable banks operating across jurisdictions in Africa, spill-over effects in bank regulations and supervision will be realised. This is further highlighted in the study by Ozil (2019) when he confirmed that only South Africa has fully implemented the Basel III standards with the majority of the countries such as Egypt, Tanzania, Kenya, Senegal, Cameroon, Uganda, Nigeria and Ghana still operating under lower standards.

Inflation is high at an average of about 8%; this could corrode the value of the banks' assets. The cost to income ratio is below 50% averaging 46.44%, but under the median of 49%. The variables in the descriptive statistics differ according to the measure of profitability and / or risk profile; however, they allow for the apprehension of the effects of regulation and supervision using different proxies for bank profitability and risk profile. Real gross domestic product (RGDP) is high at about 80%, an indication of growth in the macro economy of the selected countries. Some countries are growing at a higher rate than others, impacting positively on the profitability of banks operating in these countries.

The loan loss reserve (LLR) is low at an average of about 2% with a minimum of 0.0% and a maximum of 16 %. This reflects that the quality of the loan portfolio is good as this indicates that a lower reserve for the total loan portfolio provided for and not charged off by the bank. Capital assets will therefore be used towards the profitability of the bank. This also reflects the good risk profile of the banks in the study. Non-performing loans are also low at 3% which articulates the quality of the credit risk that banks are exposed to in the selected countries.

Table 2: Correlation analysis

	ROE	**ROA**	**RGDP**	**NPL**	**NIM**	**LLR**	**INFLATION**	**COST_TO_INCOME_RATIO**	**CAR**
ROE	1.000000	0.982655	0.325971	-0.113365	-0.003039	-0.069838	-0.150435	-0.228806	0.443974
ROA	0.982655	1.000000	0.294222	-0.0658	0.002652	-0.0451	-0.1010	-0.2442	0.445009

				21		57	52	74	
RGDP	0.325971	0.294422	1.000000	0.339090	-0.084484	0.488423	0.221646	0.398244	0.639736
NPL	-0.113365	-0.065821	0.339090	1.000000	-0.179112	0.918046	0.839853	0.548630	0.710552
NIM	-0.003039	0.002652	-0.084484	-0.179122	1.000000	-0.143047	-0.196855	0.339779	-0.134828
LLR	-0.069838	-0.045157	0.488423	0.918046	-0.143047	1.000000	0.697124	0.602539	0.786393
INFLATION	-0.150435	-0101052	0.221646	0.839853	-0.196855	0.697124	1.000000	0.404436	0.548314
COST_TO_INCOME_RATIO	-0.228806	-0.244274	0.398244	0.548630	0.339779	0.602539	0.404436	1.000000	0.435714
CAR	0.443947	0.445009	0.639736	0.710552	-0.134828	0.786393	0.548314	0.436714	1.000000

Key of variables: ***ROA****= Return on Assets;* ***ROE****= Return on Equity;* ***RGDP****= Real Gross Domestic Product;* ***NPL****= Non-Performing Loans;* ***NIM****= Net Interest Margin;* ***Inflation****=Inflation rate;* ***Cost_to_income ratio****= cost to income ratio;* ***CAR****= Capital Adequacy Ratio;* ***LLR****= Loan Loss Ratio.*

The table shows that among the explanatory variables, the correlations are weak, an indication of an absence of **multicollinearity**. The only correlation above 0.5 and therefore statistically significant is the correlation between capital adequacy ratio (CAR) and real gross domestic product (RGDP), non-performing loans (NPL), and inflation. Besides, the correlations between loan loss reserve (LLR) and RGDP, NPL, Cost to Income, inflation, CAR are also greater than 0.5 and therefore statistically significant. Investigating the signs of these coefficients of the correlations, they are positive in contrast to the negative correlations between NPL and Net Interest Margin (NIM), NIM and RGDP, Inflation, and CAR. The relationship between CAR and the dependent variables (ROE and ROA) is also significant; however, the strongest relationship is between the two dependent variables (ROE and ROA). The high correlations between explanatory variables give comfort to employ them in the models at the same time. The strong relationship between CAR and RGDP shows the ability of banks to pay liabilities during good economic growth. This is in contrast to the negative correlations between CAR and LLR, which shows that the reserve for losses by banks expressed as a percentage of total loans consumes the capital held by the banks.

Empirical analysis

Table 3 below shows the results of the panel data regression with return on equity (ROE) as the dependent variable estimated using the fixed effect model.

Table 3: ROE estimates using the fixed-effect model

Dependent Variable: ROE
Method: Panel Least Squares
Date: 06/29/20 Time: 20:03
Sample: 2009 2019
Periods included: 11
Cross-sections included: 17

Total panel (unbalanced) observations: 137				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	1.088559	0.345166	3.153725	0.0021
NPL	0.223320	0.209279	-0. 179520	0.8579
NIM	-0.644271	0.264756	-2.433451	0.0165
LLR	-1.233628	0.379676	-3.249162	0.0015
INFLATION	0.879429	0.206526	4.258192	0.0000
COST_TO_INCOME_RATIO	-0.298457	0.041564	-7. 180602	0.0000
CAR	-0.062795	0.198643	-0.316120	0.7525
C	16.77162	3.403977	4.927066	0.0000
Effects specification				
Cross-section fixed (dummy variables)				
Root MSE	5.475066	R-squared		0 878041
Mean dependent var	3.651626	Adjusted R-squared		0.853218
S.D. dependent var	3.114893	S.E. of regression		4.020753
Akaike info criterion	5.778587	Sum squared resid		1826.809
Schwarz criterion	6.290117	Log likelihood		-371.8332
Hannan-Quinn criter.	5 986461	F-statistic		35.37149
Durbin-Watson stat	2.120476	Prob (F-statistic)		0.000000

Statistically significant at 0.05 %

Based on the results of the panel regression in Table 3, it can be observed that among the internal factors or bank-specific variables, NIM, LLR, cost_to_income ratio have a statistically significant relationship with profitability at 95.95% significance level. Although the relationship is negative with ROE, there is however, a positive and statistically significant relationship between ROE and the external factors or macroeconomic-specific variables, namely: Inflation and RGDP. The relationship between NPL, CAR and ROE is statistically not significant.

The table below shows the results of the panel data regression with return on assets (ROA) as the dependent variable estimated using the fixed effect model.

Table 4: ROA estimates using fixed effect model

Dependent Variable: ROA				
Method: Panel Least Squares				
Date: 07/05/20 Time: 17:29				
Sample: 2009 2019				
Periods included: 11				
Cross-sections included: 17				
Total panel (unbalanced) observations: 137				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
RGDP	0.129634	0.053437	2.425940	0.0169
NPL	0.042514	0.032399	1.312182	0.1921
NIM	-0.099358	0.040988	-2.424070	0.0169
LLR	-0.224672	0.058779	-3.822295	0.0002
INFLATION	-0.069247	0.031973	2.165787	0.0324
COST_TO_INCOME_RATIO	-0.056789	0.006435	--8.825327	0.0000
CAR	-0.002130	0.030753	-0.069248	0.9449
C	3.442990	0.526985	6.533376	0.0000
Effects specification				
Cross-section fixed (dummy variables)				
Root MSE	0.565324	R-squared		0.856039

Mean dependent var	0.435155	Adjusted R-squared	0.826737
S.D. dependent var	1.495431	S.E. of regression	0.622471
Akaike info criterion	2.047531	Sum squared resid	43.78407
Schwarz criterion	2.559061	Log likelihood	-116.2559
Hannan-Quinn criter.	2.255404	F-statistic	29.21460
Durbin-Watson stat	2.115792	Prob (F-statistic)	0.000000

Statistically significant at 0.05 %

Based on the results of the panel regression above, it can be observed that among the internal factors or bank-specific variables, NIM, LLR, cost-to-income ratio have a statistically significant relationship with profitability. Although the relationship is negative with ROA, there is however, a positive and statistically significant relationship between ROA and RGDP; however the relationship with inflation is negative. The relationship between NPL, CAR and ROA is statistically not significant.

The study used an unbalanced panel of commercial banks in select countries in Africa to estimate the model. The panel was used to estimate both the return on equity (ROE) and the return on assets (ROA) that proxy the profitability of banks. The same panel also estimates the risk profile of banks.

From the results of the model in table 3 and 4, estimation seems to fit the dependent variables reasonably well with R squared of 87.80% and 85.60% for ROE and ROA respectively at the 99.95% level. This means that 87.80% of the sample describes ROE whilst 85.60% represent ROA. With both models having high F statistics at 35.37% and 29.22% respectively, this shows the overall significance of the estimated models. The high R squared and F statistics generated by the models also show that only just over 10% of the variation remains unexplained by the independent variables. This shows that banks in Africa tend to have good quality management and therefore are able to convert the assets of the bank into good earnings for the shareholders.

The good fit of the panel for both ROE and ROA augur well for the study as these are two of the most important measures for evaluating the quality of management of banks that manage the capital that they are entrusted with to generate the returns from the assets financed by the bank. The generation of a good return on assets has in turn a good impact on the shareholders' value.

Real gross domestic product (RGDP) is statistically significant to ROE and ROA with a positive coefficient. This reflects that when the macroeconomic conditions are healthy, shareholders' expectations of good returns can be realised under good RGDP. Management of the banks' assets during good economic conditions in the continent also has a potential for banks' profitability in the continent. The RGD positive relationship with ROE and ROA is expected and is in line with the findings in studies by Ozil (2017), Demirguc-Kunt and Huizinga (1999) and Flamini *et al.* (2009).

The impact of non-performing loans (NPL) has an insignificant impact on ROE and ROA with a negative coefficient. The negative coefficient on NPL is predictable and it reflects that as losses from loans materialise, the ROA and ROE of banks in Africa decrease. This confirms the findings of the study by Ongore and Kusa (2013), who also found a negative relationship between ROA and NPL. Ozil (2017) also came to similar conclusions. Amuakwa-Mensah and Marbuah (2015) also found that the state of the economy has some impact on the profitability of banks.

The coefficient of net interest margin (NIM) is negative and NIM is statistically highly significant. This reflects that margins commanded by banks in Africa impact negatively on shareholders' value as long as the quality of the assets is not maintained, as reflected by the negative impact that net interest margin has on ROA. It indicates that banks in Africa are earning poor interest on the loans that are offered to the customers relative to the interest paid to the customers on funds deposited with the banks. The offsets of this result are a decrease of profits for the banks and a poor return on investment for the shareholders. The negative

relationship is inconsistent with the previous literature that confirms the findings of the study by Demirguc-Kunt and Huizinga (2000) who examined the impact of financial development on bank profits and bank margins, and Naceur and Goaeid (2003) in their examination of factors that had an impact on the profits of ten Tunisian banks over the period 1980–2000. These studies and many others that were concluded in the developed countries found a positive and significant relationship between net interest margin and bank profitability.

Although the loan loss reserve (LLR) ratio is statistically highly significant, its coefficient is negative, indicating higher reserves held by banks as an indication of the low quality of the loan portfolio and therefore is not desirable to the return on shareholders' equity. A similar reflection is made with the return on assets.

Inflation is statistically significant to the dependent variables with positive coefficients to the return on equity and a negative coefficient on return on assets. This shows that inflation impacts on profitability and risk profile in a different manner for the management of assets and shareholders' equity. This could be attributed to the bank's management ability to satisfactorily forecast future inflation (although not fully) and therefore implying that interest rates have been appropriately adjusted to achieve higher profits. It reflects that above-normal profits could be gained from asymmetric information. It is consistent with the study by Boyd, Levine and Smith (2001) and also a study by Haron and Azmin (2004). On the other hand, the negative coefficient on the return on assets reflects that the quality of the loan portfolio is weak and therefore results in impairments when the inflation rate increases, and therefore results in the decrease in the return on assets being managed by banks.

Coefficient of the capital adequacy ratio (CAR) is negative and statistically insignificant. This is counterintuitive as the literature on studies in other regions shows that higher banks' capital ratio can take advantage of higher profitability (Mendes (2000), Demirguc-Kunt and Huizinga (1999) and Bashir (2000).

This could be a reflection of the poor status of the financial conditions of most banks in Africa; however, observing the behaviour of other variables, there is an indication that there are pockets of countries with strong financial regulations and supervision and sound capital positions. Banks in these countries can pursue business opportunities more effectively and at times generate more than normal profits in comparison to the global counterparts of similar stature.

On the other hand, there are countries with poor or nonexistent financial regulation and/or supervision. The aggregated status shows poorly capitalised banks in Africa, a misleading state to investors as many countries are reforming their regulatory and supervisory regimes. It could also be attributable to banks reserving or maintaining adequate capital levels do not have profitable investment proposition to invest the extra capital. Excess capital could therefore become a cost to the banks as it is not used profitably. The quality of management of banks' assets in many countries needs to improve so that assets could be managed in ways that contribute positively to shareholders' value.

Negative and statistically insignificant CAR could also be a reflection of the risk profile of banks in the continent. Banks could be taking calculated risks resulting in a good portfolio that renders capital holding insignificant. Holding less capital or no capital could contribute to profitability in the short term as all the assets are counted towards the revenue of banks. This is in line with Gale (2010) whose work found that there is no clarity that higher capital requirements will reduce the level of risk in the banking system. Barth (2012) also suggested that there is no statistically significant relationship between capital stringency, official supervisory power and bank supervision. Leaven and Levine (2009) alluded to this in an earlier study that found that capital stringency has little impact on the actual bank risk.

Non-performing loans are not significant as expected, an indication that banks could improve profitability by screening and monitoring of credit risk and such policies involve the forecasting of future levels of risks (Bilal, Saeed, Ali Gull and Akram, 2013).

The cost to income ratio is statistically significant in both the ROE and ROA estimation. This shows that the cost of operating banks does affect the banks' income and therefore their profitability and risk profile. The

increase in this ratio reflects the inefficient manner in which management of the banks are running the business.

5. Conclusions

The study investigated and analysed the impact of bank-specific and macroeconomic variables on the profitability of selected banks in Africa for the period 2009 to 2019 in the context of the scarcity of the literature on the subject in the continent. The analyses of both the bank and macroeconomic-specific variables show mixed effects on the profitability of the banks in select countries in Africa. Some of the outcomes of the analyses align with the findings from studies in other regions, although there are also statistical behavioural outcomes that reflect the uniqueness of data analysis from the continent relative to the developed economies.

From a macroeconomic variables perspective, real gross domestic product and the inflation rate are explanatory variables that were included in the study to ascertain the relationship between the macroeconomic conditions and the profitability of banks. To this end, the study found that the well-being of the economy in prospective countries in the continent is a catalyst for the performance of the banks in those countries. It is intuitive that the high inflationary pressures in many countries in the continent might offset real growth and therefore negatively impact the real profitability in the banks that operate in these economies. In essence, the macroeconomic environment appears to promote greater shareholders' earnings and profitability of banks in Africa.

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