

## Determinants of Banks Profitability: Empirical Evidence from Ghana's Commercial Banking Industry

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### Abstract

Over the years, Ghana's commercial banking industry has been bedeviled with numerous challenges. The unbridled effect of this is the 2018 banking sector megrim which led to the collapse of seven major banks. This pointed out that it is very crucial to identify and mitigate the factors that negatively affect the performance of the banking sector. This paper is used to investigate the effect of banks specific variables (BSVs) and macroeconomic variables (MEVs) on the profitability of commercial banks (NIM, ROE, and ROA) in Ghana using FRED annual data of 25 years. In order to avoid endogeneity problems and aggregation bias, we used the SURE model to run the estimates simultaneously. The result reveals that profit earned by Ghana's commercial banks is largely influenced by both internal factors such as KA, AQR, LMGT, MEFFI, and Z-Score and fluctuations in the macroeconomic environment (GDP and FOREX). The impact of KA, LMGT, MEFFI, and Z-score is significantly positive whereas AQR (NPLs) is found to have a negative effect on banks profitability. GDP has a significant negative impact on Ghana's commercial bank's profitability whiles forex induced commercial banks profitability positively, but inflation CPI does not determine the profitability of commercial banks in Ghana.

**Keywords:** Commercial banks profitability; Banks specific variables; Macroeconomic variables; Sure model; Ghana.

### 1. Introduction

The banking sectors all over the world act as the life blood of modern trade and economic development and through being a major source of finance to the economy (Murerwa, 2015). The better their financial performance are, the more the shareholders for their investment rewards (Ongore *et al.*, 2013). This, in turn, encourages additional investment and brings about economic growth. It is against this backdrop that the banks performance has been a crucial issue for bank managers, banking regulatory authorities, government, and academic researchers.

The banking sector in Africa, like the rest of the developing world, has experienced major transformation in its operating environment over the last decades. In several African countries, financial sector reforms have been implemented. The commercial banks in Sub-Saharan Africa (SSA) have become more profitable than the rest of the world with an average Return on Assets (ROA) of 2 percent over the last 10 years, significantly higher than bank returns in other parts of the world (Flamini *et al.*, 2009). As one of SSA country, Ghana also embarked the financial sector reforms in the late 1980s as part of ongoing Economic Recovery Program (ERP) (Nkegbe and Ustarz, 2015). Nevertheless, these reforms could not stop seven major banks to collapse in recent years in Ghana. The megrim causing Uni Bank, UT Bank, Capital Bank, Sovereign Bank, Royal Bank, Beige Bank Limited and Construction bank (GH) Limited to cease to operate pointed out that it is very crucial to identify and mitigate the factors that negatively affects the performance of the banking sector in Ghana.

Some researchers have claimed that for Ghana's commercial banks to perform effectively the Bank of Ghana (BoG) should undertake rigorous measures to reduce the monetary policy rate significantly (Soylemez and Ahmed, 2018). It is evident that, a fall in the monetary policy rate will lead to a significant jump in profitability and liquidity of the banks. This is because the banks will have the penchant for lending out more loans to its creditors at a reasonable rate and thus enable these potential borrowers to borrow at a lower interest rate from the commercial banks. This bolsters the performance of businesses in the economy. Some other researchers held contrary view to that recommendation. For instance, according to research conducted by Ndoum (2017) conglomerate has stressed that reduction in the monetary policy rate (MPR) will continue to have marginal effect on commercial banks rate and its performance if the factors specific to the commercial banks rate do not improve. Ndoum (2017) suggested that the key determinants of commercial banks performance have largely been characterized by high non-performing loans (banks asset quality ratio), high operating costs, high cost of funds and high risk of defaults. Ndoum (2017)

further indicated that external factors such as inflation, treasury bills and the monetary policy rate (MPR) also contribute to the performance of commercial banks in Ghana.

The determinants of the bank profitability have been investigated in a great deal of studies in the related empirical literature so far.<sup>1</sup> Overall, in the literature, the factors influencing banks profitability are put into two main categories: bank's internal factors (micro-determinants) and external factors (macro-determinants). The banks micro-determinants are generally referred to as the bank's specific factors whereas the macro-determinants are perceived to be the external factors or macroeconomic factors that induce the performance of commercial banks. On the other hand, the internal factors are individual bank characteristics which affect the bank's performance. These factors are basically influenced by the internal decisions of management and board. Some of them are listed as capital adequacy, asset quality ratio, management efficiency, liquidity management, cost efficiency, and ownership identity (Ongore *et al.*, 2013; Wong *et al.*, 2007). On the other hand, the external factors are sector wide or country wide factors which are beyond the control of the banks (Ongore *et al.*, 2013). As external factors, there are resilient macroeconomic environment such as stable inflation and exchange rate as well as sustained increase in the growth of GDP as well as market structure. Among the various approaches, several studies have focused on the structure-performance relationship of banks, the structure- conduct-performance (SCP) hypothesis and the efficient-structure (EFS) hypothesis (Wong *et al.*, 2007).

In this study, we investigate the key factors that affected the profitability of Ghana's commercial banks (35 commercial banks) over the period 1992 to 2017. To this end, we apply SURE model due to its several advantages over the competent models. For instance, the advantages of the model suggest that, while OLS technique can give inconsistent results in case of endogeneity problem, SURE can be used to circumvent this problem by estimating all equations simultaneously (Rachna and Majumdar, 2014). Furthermore, the model avoids aggregation bias and thus ensures a prudent test of equality of regression coefficient vectors applied in the analysis of micro-investment relations (Zellner, 1962), while "the least squares residuals may be used to estimate consistently the elements of covariance matrix of disturbance (Greene, 2002).

A lots of studies such as Ahiabor (2013), Kutsienyo (2011), Nkegbe and Ustarz (2015), Owusu-Antwi *et al.* (2015), Boadi *et al.* (2016) and Amo (2015) has been conducted using Ghanaian data to measure the performance of banks profitability. Interestingly, our study is unique and novel in terms of the econometric model applied and the up-to-date nature of our data. The contribution of this study will add to existing literature and make a significant stride to uncover the recent megriems that befuddled Ghana's commercial banking industry.

The rest of the paper is structured as follows: Section 2 provides vivid explanation on the research methodology employed by the researchers and operationalization of the study area. The third section of the paper provides empirical analysis of the data used in the research and the results are presented and discussed in relation to another research. Finally, section 4 provides some concluding remarks and policy recommendation.

## 2. Data and Methodology

### 2.1. Data Set

For this study, we utilized the annual data covering the period between 1992 and 2017, constituting the bank's net interest margin (NIM), bank's return on assets (ROA), bank's return on equity (ROE), asset quality ratio (AQR), capital adequacy ratio (KA), liquidity management (LMGT), management efficiency (MEFFI), bank's z-score, gross domestic product (GDP), inflation (INFCPI) and foreign exchange rate (FOREX) of Ghana. Therefore, the micro-determinants we use in this study are the asset quality ratio (non-performing loans), capital adequacy, liquidity management, management efficiency, banks z-score as, while the macro-determinants are inflation CPI, GDP, and forex. The descriptions and the sources of the variables are reported in Table 1.

Table-1. Research Variables

Variables	Measurements	Units	Data Source
<b>Dependent Variables:</b>			
<b>NIM</b>	NIM is the bank's net interest margin. NIM measures the accounting value of bank's net interest revenue as a share of its average interest-bearing (total earning) assets.	Percent	(Worldbank, 2018b)
<b>ROA</b>	ROA is the commercial bank's return on assets. It measures commercial bank's net income or revenue to yearly averaged total assets	Percent	(Worldbank, 2018c)
<b>ROE</b>	ROE represent commercial bank's return on equity. It measures commercial banks' net income or net revenue to yearly averaged equity.	Percent	(Worldbank, 2018d)
<b>Independent Variables</b>			
<b>AQR</b>	AQR is defined as the commercial bank's asset quality ratio. In Ghana banking industry, it is also known as the bank's non-performing loans (NPL). This measures the ratio of defaulting loans (payments of interest and principal	Percent	(Worldbank, 2018e)

<sup>1</sup> Appendix 2 lists some of the recent studies investigating the bank profitability in detail.

	past due by 90 days or more) to total gross loans (total value of loan portfolio). The loan amount recorded as nonperforming includes the gross value of the loan as recorded on the balance sheet, not just the amount that is overdue.		
<b>KA</b>	KA represent the capital adequacy of deposit takers. It is a ratio of total regulatory capital to its assets held, weighted according to risk of those assets.	Percent	(Worldbank, 2018f)
<b>LMGT</b>	LMGT represent the commercial bank's liquidity management. This measures commercial bank's ability to meet its financial commitments or obligations. It is a process of effectively managing a bank portfolio mix of assets, liabilities and when applicable off-balance sheet contracts. This process involves two primary financial risks, interest rate and foreign exchange, and directly relates to sound over all liquidity management.	Percent	World bank and IMF Database
<b>MEFFI</b>	MEFFI defines the management efficiency of commercial banks. Management efficiency is the ratio between management results (numerator) and management inputs (denominator) In the banking industry, managerial efficiency ensures prudent measures of bank's products such as deposits raised, advances disbursed, and a host of services rendered to depositors, borrowers and others who utilize bank 92 services. Improvement in efficiency will ultimately lead to larger profits and lower costs. The average profit and cost per employee are also taken as indicators to measure the efficiency of employees. The quantum of non-performing asset also plays a major role in deciding the management efficiency of the banks.	Percent	Worldbank, ( <i>Chapter III Management Efficiency and Profitability Parameters of Urban Cooperatives Banks</i> , n.d.)
<b>Bank's Z-Score</b>	It captures the probability of default of a country's banking system, calculated as a weighted average of the z-scores of a country's individual banks (the weights are based on the individual banks' total assets). Z-score compares a bank's buffers (capitalization and returns) with the volatility of those returns. It is calculated as $(ROA + (equity/assets))/sd(ROA)$ ; $sd(ROA)$ is the standard deviation of ROA. (Calculated from underlying bank-by-bank unconsolidated data from Bankscope)	Z-score	(Worldbank, 2018g)
<b>GDP</b>	GDP is the gross domestic product for Ghana. Its measures the sum of gross value added by all domestic producers in the economy plus any product taxes and deduct any subsidies excluded in the value of the products. It is determined without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange	Current U.S. Dollars	(Worldbank, 2018a)
<b>INFCPI</b>	INFCPI denotes inflation, consumer price index for Ghana. It is measured by the consumer price index which reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.	Percent	(Worldbank, 2018h)
<b>FOREX</b>	FOREX represent Exchange Rate to U.S. Dollar for Ghana. It measures the domestic currency units per the United States dollars.	National Currency Units per US Dollar	(Pennsylvania, 2012), (Worldbank, 2018a)

Source: Researcher's Computation, December 2018

## 2.2. Summary of Descriptive Statistics

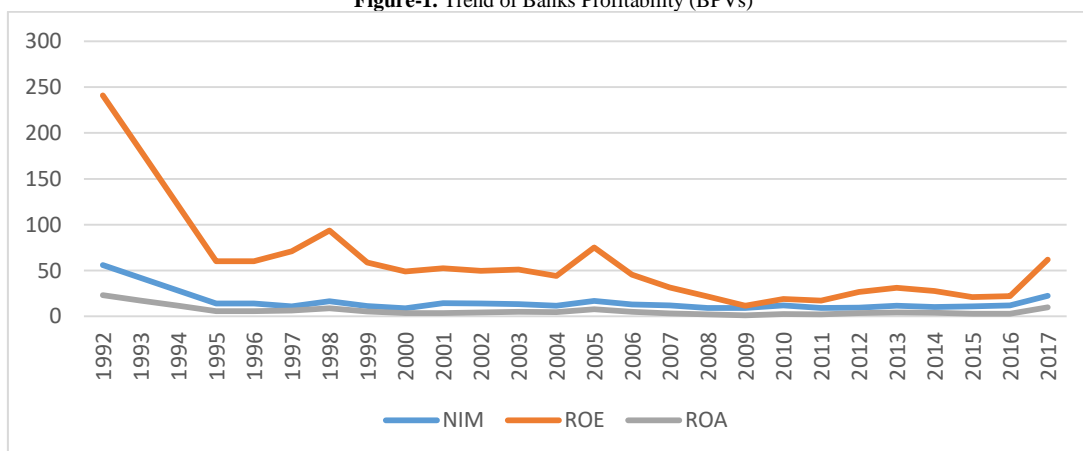
Table-2. OLS Regression: Summary of Descriptive Statistics

Variables	Obs	Mean	Std. Dev.	Min	Max
d2ROE	24	4.168602	25.84688	-60.8367	60.3195
d2NIM	24	1.016902	5.918888	-10.509	14.2743
d2ROA	24	.5296078	2.809249	-6.04893	6.856492
d2Banks' Z-Score	24	.4221679	2.473782	-5.32	8.559748
d2KA	24	.7647396	3.699548	-5.6	13.41
d2AQR	24	1.691208	6.732329	-7.5	20.37699
d2LMGT	24	7.419191	39.54339	-104.2	119.4713
d2MEFFI	24	1.777724	11.7505	-24.18	34.72
d2GDP	24	1.53e+09	7.32e+09	-1.51e+10	2.53e+10
d2INFCPI	24	21.51802	97.84424	-25.90909	474.7225
d2FOREX	24	-.1372118	.8862417	-4.046351	.9168

Source: Author's Estimation, December 2018

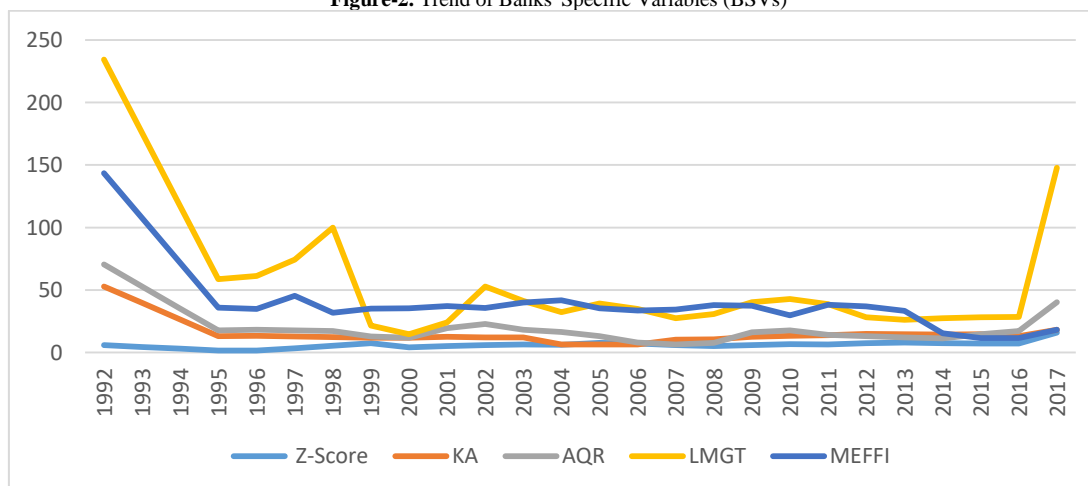
Figure 1. shows the trend of banks Profitability in Ghana and comparison during the period under study (1992–2017) by taking into consideration the financial performance indicators such as NIM, ROA, and ROE. Figure 2 below highlights the trend of banks specific variable such as Z-Score, Asset Quality ratio (AQR), Capital Adequacy (KA), Liquidity Management (LMGT), and Management Efficiency (MEFFI), which are microeconomic variables or inherent factors that influence the performance of banks. Figure 3 shows the trend of macroeconomic variables (MVs)), which are Gross Domestic Product (GDP), Inflation (INFCPI) and Foreign Exchange Rate (FOREX). These are the external factors that can cause the performance of banks in Ghana. Finally, the aggregation of all the trend variables is shown in Figure 4. It depicts profitability of banks, banks specific variables and the macroeconomic variable. In all figures, Y-axis represents the values of each profitability indicator, while X-axis represents the observation period (Years). DB, Domestic Banks (18 Banks); FB, Foreign Banks (17 Banks); and TBG, Total Banks in Ghana (35 Banks used in this study). Consider full details of the Ghanaian Banks in Appendix 1.

Figure-1. Trend of Banks Profitability (BPVs)



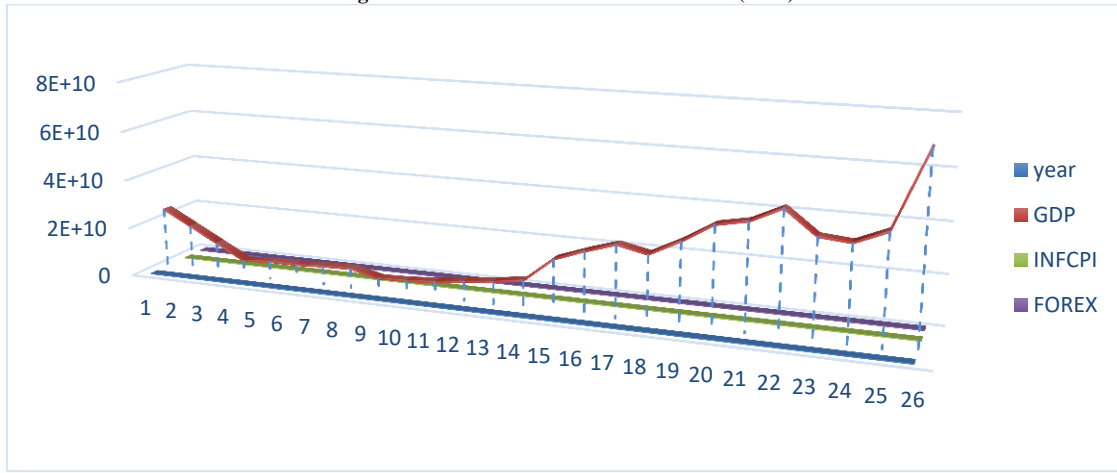
Source: Researcher's Sketch, November 2018

Figure-2. Trend of Banks' Specific Variables (BSVs)



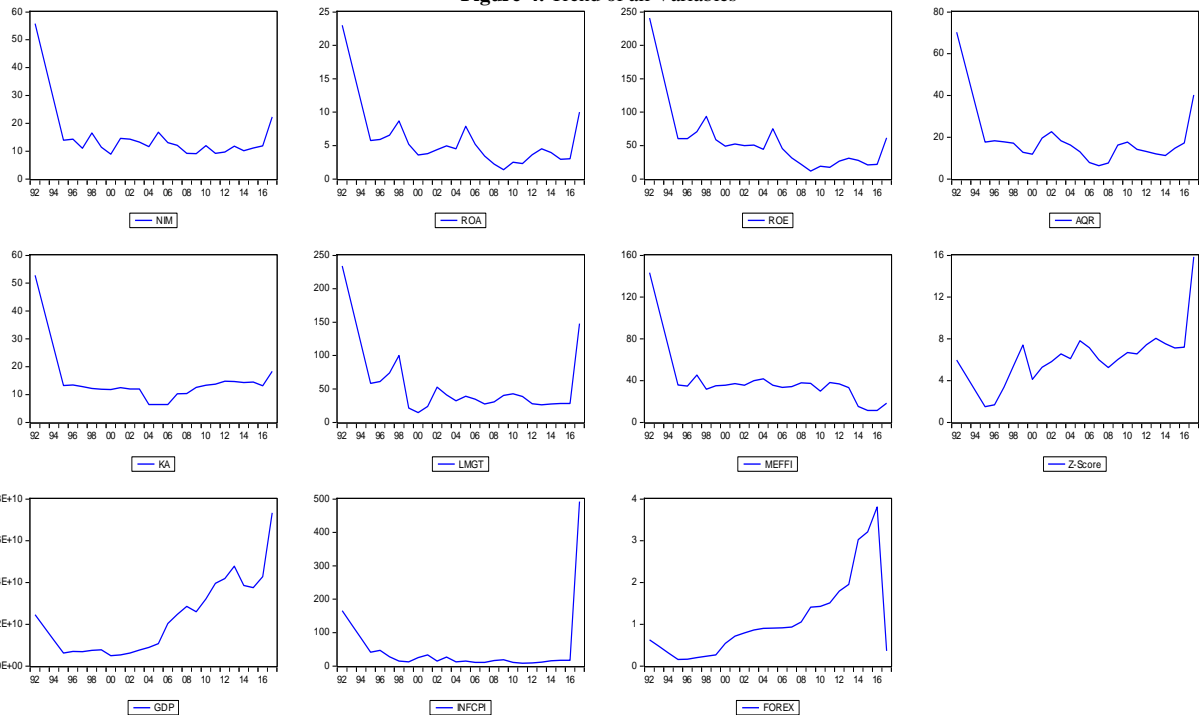
Source: Researcher's Sketch, November 2018

Figure-3. Trend of Macroeconomic Variables (MVs)



Source: Researcher's Sketch, November 2018

Figure-4. Trend of all Variables



Source: Author's Sketch, December 2018

**2.2.1. Methodology: Seemingly Unrelated Regression Equation (SURE) Model**

In this study, we employed the seemingly unrelated regression equation (SURE) model to investigate the determinants of bank profitability using data from the Ghanaian economy. SURE model, proposed by Zellner (1962), is used to estimate the parameters of a set of regression equation.

Zellner (1962) and Zellner and Huang (1962) set out the seemingly unrelated regression equation (SURE) model as expressed below

$$y_{\mu} = X_{\mu}\beta_{\mu} + U_{\mu} \dots \dots \dots (4)$$

Here (4) represent U<sup>th</sup> equation of an N equation regression on system with  $y_{\mu}$  a TX 1 vector of observations on the u<sup>th</sup> "regressand" variable,  $X_{\mu}$  a TX I matrix with rank 1 of observations on 1, "explanatory" no stochastic variables,  $\beta_{\mu}$  a  $l_{\mu}$  X 1 vector of regression coefficients and  $U_{\mu}$  is a TX 1 vector of disturbance terms, each with mean zero.

The system of which (4) is an equation may be expressed as:

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_N \end{bmatrix} = \begin{bmatrix} X_1 & 0 & \dots & 0 \\ 0 & X_2 & & 0 \\ \vdots & \vdots & & \vdots \\ 0 & 0 & & X_N \end{bmatrix} \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_N \end{bmatrix} + \begin{bmatrix} U_1 \\ U_2 \\ \vdots \\ U_N \end{bmatrix} \dots \dots \dots (5)$$

From equation (4) we generate (3) as  $y = X\beta + U \dots \dots \dots (6)$  where y represents banks profitability in Ghana and X represent both bank specific variables and external factors such as the macroeconomic environment. We further express the model as

$$BPVs = BSVs\beta_1 + MVs\beta_2 + U \dots \dots \dots (7)$$



Where BPVs represent bank profitability variables such as net interest margin (NIM), Return on Assets (ROA) and Return on Equity (ROE), BSVs denotes banks specific variables such as AQR (Assets Quality Ratio) also known as non-performing loans, KA (Capital Adequacy), LMG (Liquidity Management), MEFFI (Management Efficiency) and Banks Z-Score. Conversely, the macroeconomic variables are represented by MVs in the model. This includes GDP, Forex, and Inflation CPI (INFCPI). From equation (4) the following equations can be deduce as  $BPVs = \beta_{1,1}(AQR) + \beta_{1,2}KA + \beta_{1,3}LMGT + \beta_{1,4}MEFFI + \beta_{1,5}Z - Score + \beta_{2,1}GDP + \beta_{2,2}INFCPI + \beta_{2,3}FOREX + U$  ..... (8)

We then determine the model for each of the bank's profitability indicators as:

$$NIM = \beta_{1,1}(AQR) + \beta_{1,2}KA + \beta_{1,3}LMGT + \beta_{1,4}MEFFI + \beta_{1,5}Z - Score + \beta_{2,1}GDP + \beta_{2,2}INFCPI + \beta_{2,3}FOREX + U \dots \dots \dots (9)$$

$$ROE = \beta_{1,1}(AQR) + \beta_{1,2}KA + \beta_{1,3}LMGT + \beta_{1,4}MEFFI + \beta_{1,5}Z - Score + \beta_{2,1}GDP + \beta_{2,2}INFCPI + \beta_{2,3}FOREX + U \dots \dots \dots (10)$$

$$ROA = \beta_{1,1}(AQR) + \beta_{1,2}KA + \beta_{1,3}LMGT + \beta_{1,4}MEFFI + \beta_{1,5}Z - Score + \beta_{2,1}GDP + \beta_{2,2}INFCPI + \beta_{2,3}FOREX + U \dots \dots \dots (11)$$

Alternatively, we rewrite the above models as

$$\pi_{it} = C + \sum_{k=1}^K \beta_k X_{it}^k + \varepsilon_{it} \dots \dots \dots (12)$$

Given the variables, the full system of equations is then expressed by:

$$\pi_{it} = \alpha_{it} + \beta_1 AQR_{it} + \beta_2 KA_{it} + \beta_3 LMGT_{it} + \beta_4 MEFFI_{it} + \beta_5 BS_{it} + \beta_6 M2_{it} + \beta_7 GDP_{it} + \beta_8 INFCPI_{it} + \beta_9 FOREX_{it} + \beta_{10} RGDPPC_{it} + V_i + U_{i,t} \dots \dots \dots (13)$$

$$NIM_{ig,t} = \alpha + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (14)$$

$$NIM_{ig,t} = \alpha + \gamma ROA_{ig,t-1} + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (15)$$

$$ROE_{ig,t} = \alpha + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (16)$$

$$ROE_{ig,t} = \alpha + \gamma ROA_{ig,t-1} + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (17)$$

$$ROA_{ig,t} = \alpha + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (18)$$

$$ROA_{ig,t} = \alpha + \gamma ROA_{ig,t-1} + \sum_j \beta_j X_{ig,t}^j + \sum_m \beta_m X_{g,t}^m + \sum_n \beta_n X_t^n + V_{i,t} \dots \dots \dots (19)$$

From equation (2) we define y as  $y = [y_1^t \ y_2^t \ \dots \ y_M^t]^t \dots \dots \dots (20)$ ,  $\beta = [\beta_1^t \ \beta_2^t \ \dots \ \beta_M^t]$ ,  $U = [U_1^t \ U_2^t \ \dots \ U_M^t]^t \dots \dots \dots (21)$  and X represent the block-diagonal matrix on the right-hand side of equation (5). The MT X 1 disturbance vector in equation (5) and (6) are assumed to have the following Variance-Covariance matrix:

$$\Sigma = V(U) = \begin{bmatrix} \partial_{11}^t & \partial_{12}^t & \dots & \partial_{1M}^t \\ \partial_{21}^t & \partial_{22}^t & \dots & \partial_{2M}^t \\ \vdots & \vdots & \ddots & \vdots \\ \partial_{M1}^t & \partial_{M2}^t & \dots & \partial_{MM}^t \end{bmatrix} = \begin{bmatrix} \partial_{11} & \partial_{12} & \dots & \partial_{1M} \\ \partial_{21} & \partial_{22} & \dots & \partial_{2M} \\ \vdots & \vdots & \ddots & \vdots \\ \partial_{M1} & \partial_{M2} & \dots & \partial_{MM} \end{bmatrix} \otimes I \dots \dots \dots (22) \Sigma_e \otimes I$$

where I is the unit matrix of order T X T and  $\delta_{\mu\mu} = E(U_{\mu t} U_{\mu t})$  for  $t=1, 2, \dots, T$  and  $\mu, \mu'=1, 2, \dots, M$ . By transforming equation (5) and (6), we create a single-equation regression model and then employ Aitken's generalized least-squares by pre-multiplying both sides of (6) by a matrix H which yields  $E(H'UH) = H'UH = I$ . This is given by:

$$b^* = (X'H'HX)^{-1}X'H'Hy = ((X'\Sigma^{-1}X))^{-1}X'\Sigma^{-1}y \dots \dots \dots (23)$$

Following from (Greene, 2002), if the matrix is unknown, the above model can be estimated by the regression residuals with the consistently estimated elements of  $\Sigma^{\wedge}$  given by

$$P_{jk}^{\wedge} = \frac{e_j' e_k}{T} \dots \dots \dots (24) \text{ j, k 1, } \dots \dots \dots \text{, where } e_j \text{ is the least square residuals from equation j.}$$

### 3. Empirical Results and Discussions

In this research, in order to investigate the determinants of banks profitability, we applied the lag length selection criteria to determine the number of lags to be used in the model as highlighted in Table 3. We then compute ADF and Phillips-Perron Unit Roots in order to ascertain the stationarity between the variables and thus justify the stability condition of the model as shown in the table 4, 5 and appendix 3. Finally, table 6 exhibit the SURE model computation and empirical analysis. The details of the analysis are highlighted below:

**Table-3.** Lag Order Selection Criteria

VAR Lag Order Selection Criteria

Endogenous variables: NIM ROA ROE

Exogenous variables: C

Date: 03/04/18 Time: 12:38

Sample: 1992 2017

Included observations: 24

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-196.3596	NA	3293.849	16.61330	16.76056	16.65237
1	-162.0879	57.11951*	404.6848*	<b>14.50732*</b>	<b>15.09635*</b>	14.66359*
2	-156.8791	7.379162	579.3722	14.82325	15.85405	15.09673

\* Reveals the lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 0.05 level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: Researcher's Computations, 2018

Based on AIC and SC we select the most suitable lag of 1. The results of AIC and SC are **14.50732** and **15.09635** respectively indicates the lag order selected by the criterion. They are widely used in VAR modeling. The reason is that the two information criteria are good and reliable and used to choose parameter that minimizes it. The SC selects fewer lag, while any further regressor raises the penalty for the loss of degrees of freedom while AIC delivers extremely large model. It is always better to select model with too many lags than too few. This is to make sure that autocorrelation in the remaining VAR model is killed; AIC is therefore chosen as the leading indicator.

**Table-4.** ADF Unit Root Test at Levels and 2nd Difference with Trend and Intercept

Variables	ADF at Levels		ADF at 1 <sup>st</sup> Difference		ADF at 2 <sup>nd</sup> Difference	
Dependent Variables:	Test Statistics	P-Value	Test Statistics	P-Value	Test Statistics	P-Value
NIM	-4.418101	0.0091**	-3.810183	0.0338**	-7.506805	0.0000**
ROA	-3.166900	0.1136	-3.278846	0.0937	-5.244950	0.0017**
ROE	-4.152700	0.0161**	-3.610769	0.0501	-6.178779	0.0002**
Independent Variables:						
AQR	-2.709940	0.2411	-2.406099	0.3674	-4.017085	0.0229**
KA	-6.257520	0.0001**	-3.083453	0.1324	-6.131701	0.0003**
LMGT	-2.196042	0.4712	-3.336839	0.0843	-4.971932	0.0031**
MEFFI	-5.267463	0.0015**	-3.158332	0.1162	-5.848217	0.0005**
Z-Score	-2.318667	0.4096	-2.865137	0.1901	-4.604440	0.0067**
Macroeconomic Factors:						
GDP	-1.388178	0.8394	-2.191367	0.4727	-3.766436	0.0377**
INFCPI	0.454541	0.9984	-1.217732	0.8836	-1.168890	0.8933
FOREX	-3.128790	0.1216	-2.427358	0.3575	1.033147	0.9997
Note: Test Critical Values	<b>1% Level</b>	<b>-4.374307</b>	<b>1% Level</b>	<b>-4.394309</b>	<b>1% Level</b>	<b>-4.416345</b>
	<b>5% Level</b>	<b>-3.603202</b>	<b>5% Level</b>	<b>-3.612199</b>	<b>5% Level</b>	<b>-3.622033</b>
	<b>10% Level</b>	<b>-3.238054</b>	<b>10% Level</b>	<b>-3.243079</b>	<b>10% Level</b>	<b>-3.248592</b>

Source: Researcher's Computation, 2018

MacKinnon (1996) approximate one-sided p-value: with Trend and Intercepts at second difference: -4.416345 (1%), -3.622033 (5%), and -3.248592 (10%). As shown in Table 4, the test statics and the one-sided p-values indicates that all the variables were not stationary at level and first difference with trend and intercepts- that is they were not integrated at order zero [I (0)]. This means that there exists unit root among some of the variables i.e., ROA, AQR, LMGT, Z-score, GDP, INFCPI and Forex. In order to use such variable to generate regression coefficient that are unbiased and efficient they must be made stationary. Consequently, the second difference of the NIM, ROA, ROE, AQR, KA, LMGT, MEFFI, Z-score, GDP, INFCPI and Forex were used, and Augmented Dicky-Fuller test was carried out on the variables. The details of the outputs are shown in the Table 4. Above

**Table-5.** Phillips-Perron Test Equations at Levels and 2<sup>nd</sup> Difference with Trend and Intercept

Variables	PP at Levels		PP at 1 <sup>st</sup> Difference		PP at 2 <sup>nd</sup> Difference	
Dependent Variables:	Adj.t-statistics	P-Value	Adj.t-Stats	P-Value	Adj. t-statistics	P-Value
<b>NIM</b>	-5.189115	0.0016	-3.747664	0.0383	-8.229128	0.0000**
<b>ROA</b>	-3.269455	0.0944	-2.960442	0.1629	-5.324420	0.0014**
<b>ROE</b>	-4.729296	0.0046	-3.463675	0.0665	-6.916185	0.0000**
Independent Variables:						
<b>AQR</b>	-2.709940	0.2411	-2.313812	0.4114	-3.922029	0.0277**
<b>KA</b>	-7.055611	0.0000**	-2.982602	0.1570	-6.155811	0.0002**
<b>LMGT</b>	-1.913739	0.6176	-2.830959	0.2006	-4.934135	0.0033**
<b>MEFFI</b>	-6.051045	0.0002**	-3.374555	0.0786	-7.027100	0.0000**
<b>Z-Score</b>	-2.189116	0.4747	-2.664646	0.2581	-4.393280	0.0105**
Macroeconomic Factors:						
<b>GDP</b>	-1.344072	0.8523	-2.191367	0.4727	-3.791789	0.0359**
<b>INFCPI</b>	0.454541	0.9984	-1.217732	0.8836	-1.168890	0.8933
<b>FOREX</b>	-3.074146	0.1337	-2.070458	0.5353	-4.349104	0.0115**
<b>Note: Test Critical Values</b>	<b>1%Level</b>	<b>-4.374307</b>	<b>1%Level</b>	<b>-4.394309</b>	<b>1%Level</b>	<b>-4.416345</b>
	<b>5%Level</b>	<b>-3.603202</b>	<b>5%Level</b>	<b>-3.612199</b>	<b>5%Level</b>	<b>-3.622033</b>
	<b>10%Level</b>	<b>-3.238054</b>	<b>10%Level</b>	<b>-3.243079</b>	<b>10%Level</b>	<b>-3.248592</b>

Source: Researcher's Computation, 2018

We determine the stationarity of the time series data by running Phillips- Perron tests. At level and 1<sup>st</sup> difference with trend and intercepts, no series for PP test were stationary. By determining the second difference of all the series, the result revealed that the time series is stationary; absence of unit root, with the PP test statistic being significant at the 0.01 level at the second difference which is confirmed by the ADF test of revealing significant at 0.99 confident level. With the evidence that, the eight variables are integrated of order one i.e. I (1) – they are stationary for both ADF and PP at second difference. Hence it is imperative to run the test for multivariate cointegration using (Johansen, 1988) cointegration test of non-stationary series variables. However, in order to avoid endogeneity problem and aggregation bias we used the SURE model to run the estimates simultaneously. The idea is to check whether the variables influence banks profitability negatively or positively. The unit root test for both ADF and Philip Peron (PP) test were performed to deduce the possibility of stationarity between/amongst the variables. This is indicated in the table 4 and 5. Above

NB: \*\*\*\*0.01, \*\*\*\*0.05 and \*\*\*\*0.10 asymptotic critical values for both ADF and PP test at levels at second difference are -4.416345, -3.622033 and -3.248592.

**Table-6.** Seemingly Unrelated Regression (SUR) Model

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
<b>NIM</b>	26	7	1.888499	0.9679	783.56	0.0000
<b>ROE</b>	26	7	9.044311	0.9684	750.26	0.0000
<b>ROA</b>	26	7	.9998429	0.9559	561.04	0.0000
Variables	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
<b>NIM</b>						
<b>KA</b>	.2783526	.1960246	1.42	0.156	-.1058485	.6625537
<b>AQR</b>	-.0512138	.1667429	-0.31	0.759	-.3780239	.2755963
<b>LMGT**</b>	.0894563	.0266773	3.35	0.001	.0371697	.1417428
<b>Z-Score**</b>	.6326479	.2927105	2.16	0.031	.0589459	1.20635
<b>MEFFI**</b>	.1569978	.0573601	2.74	0.006	.0445741	.2694216
<b>GDP**</b>	-1.83e-10	6.48e-11	-2.82	0.005	-3.10e-10	-5.56e-11
<b>INFCPI</b>	.0170608	.015464	1.10	0.270	-.0132481	.0473697
<b>FOREX**</b>	2.418866	1.114809	2.17	0.030	.2338807	4.60385
<b>CONS</b>	-2.36391	1.589891	-1.49	0.137	-5.48004	.7522201
<b>ROE</b>						
<b>KA**</b>	2.854597	.9387916	3.04	0.002	1.014599	4.694595
<b>AQR**</b>	-2.192526	.7985571	-2.75	0.006	-3.757669	-.6273825
<b>LMGT**</b>	.7129482	.1277617	5.58	0.000	.4625399	.9633564
<b>MEFFI**</b>	.5702611	.2747063	2.08	0.038	.0318467	1.108675
<b>Z-Score**</b>	4.647795	1.401835	3.32	0.001	1.900249	7.395341
<b>GDP**</b>	-1.88e-09	3.10e-10	-6.05	0.000	-2.49e-09	-1.27e-09
<b>INFCPI</b>	.106744	.0740594	1.44	0.149	-.0384098	.2518978



<b>FOREX**</b>	10.6564	5.338988	2.00	0.046	.1921792	21.12063
<b>CONS</b>	-9.282295	7.614232	-1.22	0.223	-24.20592	5.641326
<b>ROA</b>						
<b>KA</b>	.1981937	.1037828	1.91	0.056	-.0052168	.4016043
<b>AQR**</b>	-.2216629	.08828	-2.51	0.012	-.3946885	-.0486373
<b>LMGT**</b>	.0796676	.014124	5.64	0.000	.0519851	.10735
<b>MEFFI**</b>	.0614125	.0303686	2.02	0.043	.0018911	.1209338
<b>Z-Score**</b>	.4600257	.154972	2.97	0.003	.1562862	.7637651
<b>GDP**</b>	-1.40e-10	3.43e-11	-4.09	0.000	-2.08e-10	-7.32e-11
<b>INFCPI</b>	.0131874	.0081872	1.61	0.107	-.0028593	.0292341
<b>FOREX**</b>	1.200689	.5902218	2.03	0.042	.0438758	2.357503
<b>CONS</b>	-1.391371	.8417485	-1.65	0.098	-3.041168	.2584261

Source: Author's Computation, December 2018

Note: from table 6. above, the Seemingly Unrelated Regression Equation (SURE) estimator with  $P > |z|$  which indicate the significance level at 0.05 reveals that:

NIM which is one of the most important banks profitability in Ghana is positively influenced by commercial bank's internal factors such as Liquidity management (LMGT), Z-score and management efficiency (MEFFI). On the other hand, the net interest margin is also determined by the macroeconomic environment such as Gross Domestic Product (GDP) and foreign exchange rate (FOREX). The impact of GDP to NIM reveals a negative impact on profitability whereas forex contributes positively to the growth of net interest margin (NIM). However, the net interest margin (NIM) is not determined by factors such as capital adequacy (KA), asset quality ratio (AQR) and inflation CPI (INFCPI) since it is not significant at 5% level (marked \*\*).

ROE is influenced by all the internal factors such as KA, AQR, LMGT, MEFFI and z-score and some external factors such as GDP and FOREX determines the ROE among commercial banks in Ghana. However, both AQR and GDP contributes negatively to commercial bank's return on equity.

ROA is also one of commercial banks profitability measures. As can be seen from Table 5, ROA is determined largely by all the internal factors except KA and the macroeconomic variables such as GDP and FOREX does influence the bank's return on assets (ROA). AQR and GDP influence bank's ROA negatively. That is, that inflation CPI (INFCPI) does not determine or contribute to bank's return on assets in Ghana.

The SURE model expounded by Zellner (1962) and Zellner and Huang (1962) shows that the profit earned by Ghana's commercial banks is largely influenced by both internal factors such as the bank's specific variables and fluctuations in the macroeconomic environment. From table 6. Indicates that the key bank's specific variables that determines the bank's profitability were KA, AQR, LMGT, MEFFI and Z-score. However, the AQR shows a negative contribution to the profitability of commercial banks in Ghana. Among the macroeconomic variables that influence the profit earned by commercial were GDP and FOREX, but INFCPI does not in any way determines the profitability of banks in the Ghanaian economy.

St. Err refers to the Windmeijer (1992) robust standard errors, coef = coefficients of the variables,  $P > |z|$  = probability values greater than Z-value Superscript \*\* denotes the acceptance of the null hypothesis that the variable determines banks profitability at less than 5%, significance level meaning that it is statistically significant; [95% Conf. represent the confident level at 95%. Sample included observations: 26

Table-7. Correlation Matrix for both the Dependent Variables and Independent Variables

E(V)	d2NIM d2ka	d2aqr	d2lmgt	d2z_score	d2meffi	d2gdp	d2infcp
d2NIM							
d2ka	.08222694						
d2aqr	-.01381034	.04902341					
d2lmgt	-.00107011	-.00476418	.00110997				
d2z_score	-.02865127	-.04222597	.0063393	.23659112			
d2meffi	-.00866125	-.00797752	.00139744	.01159053	.00783184		
d2gdp	-3.739e-12	1.293e-11	-1.977e-12	-1.244e-11	-8.288e-12	4.346e-20	
d2infcp	-.0018735	-.00027778	-.00011352	-.00083236	.00005244	1.302e-12	.000521
d2forex	-.26895354	.02681518	-.00354791	.26077956	-.02080615	3.830e-10	.053985
_cons	.00503925	-.01512256	.00046108	-.00146124	-.00036717	-2.632e-11	-.00281
d2ROE	d2ROE d2ka	d2aqr	d2lmgt	d2z_score	d2meffi	d2gdp	d2infcp
d2ka	.08222694						
d2aqr	-.01381034	.67572619					
d2lmgt	-.00107011	-.07110466	.01581741				
d2z_score	-.02865127	-.1345449	.01863666	.10068245			
d2meffi	-.00866125	-.67341272	.08640064	.1266231	3.2773594		
d2gdp	-3.739e-12	1.780e-10	-2.915e-11	-1.248e-10	-1.969e-10	6.243e-19	
d2infcp	-.0018735	-.00822752	-.00196402	-.00189194	-.02076117	1.762e-11	.006953
d2forex	-.26895354	-.2195058	-.09812371	-.68014366	2.5025645	5.358e-09	.696168

_cons	.00503925	-.20668969	.0075282	.00182856	.0024924	-3.764e-10	-.039020
d2ROA							
d2ka	.006953						
d2aqr	-.00035832	.00580254					
d2lmgmt	-.00002777	-.0006032	.00013512				
d2meffi	-.00022473	-.00112197	.00016088	.00087444			
d2z_score	-.00074339	-.00565859	.00074326	.00113232	.02812099		
d2gdp	-9.701e-14	1.529e-12	-2.477e-13	-1.057e-12	-1.656e-12	5.326e-21	
d2infcp	-.00004861	-.00006468	-.00001632	-.0000127	-.00016567	1.518e-13	.000060
d2forex	-.00697829	-.00108496	-.00077576	-.00530633	.02297256	4.590e-11	.00604
_cons	.00013075	-.00177725	.00006305	6.347e-06	-9.332e-06	-3.214e-12	-.000334
<b>Breusch-Pagan test of independence: chi2(3) = 58.570 Pr= 0.0000</b>							

Source: Researchers' Estimation, Dec. 2018

#### 4. Conclusion and Policy Recommendation

In view of the numerous challenges that befuddled Ghana's commercial banking industry, it is important to critically interrogate the determinants of banks profitability in a lower-middle income country using SURE model. The explanatory variables used in the model constitutes both banks specific variables i.e., capital adequacy (KA), asset quality ratio (AQR), liquidity management (LMGT), management efficiency (MEFFI) and z-score and the macroeconomic variables which encapsulates GDP, FOREX and INFCPI. The dependent variables employed in the model were the bank's profitability variables. These include return on asset (ROA), return on equity (ROE) and net interest margin (NIM).

The empirical findings of the data reveal that both internal factors and external factors contribute immensely to determining bank profitability in Ghana. With regards to the internal factors such as bank specific variables, indicates that KA, LMGT, MEFFI and Z-score contribute positively to determining banks profitability in Ghana. However, the AQR shows a negative contribution to the profitability of commercial banks in Ghana. Meaning that non-performing loans influence the profitability of commercial banks negatively and thus have a significant negative impact on the performance of commercial banks. Among the macroeconomic variables that influence the profit earned by commercial were GDP and FOREX, but INFCPI does not in any way determines the profitability of banks in the Ghanaian economy. However, the analysis reveals that GDP of Ghana contribute significantly to the performance of banks in a negative way and Forex contribute positively to determinants of commercial banks profitability in Ghana. This means that fluctuations of forex or the depreciation of the Ghanaian cedi against the major foreign currencies shackles the progress of banks performance in Ghana. In conclusion, the findings of our studies support the evidence provided by [Rachna and Majumdar \(2014\)](#) and [Gunnarsdóttir and Mostepan \(2013\)](#)

The study offers the following recommendation for policymakers to help avert the numerous challenges that negatively affects the performance of commercial banks in Ghana. First, monetary policy regimes aim at ensuring price stability and the stabilization of the local currency by the Bank of Ghana could help deal with the pestilent effects of the fluctuations of the macroeconomic environment.

In a case of asset quality ratio or non-performing loans (NPL), it is imperative for commercial banks to properly sensitize borrowers on the need for timely repayment of their debts and on their rights under the Central Bank of Ghana's Guideline commonly known as the Disclosure and Products Transparency Rules for Credit Products and Services which is in pursuance to Section 7 of the Borrowers and Lenders Act, 2008 (Act 773). Also, frequent publication of the list of commercial banks defaulters and providing incentives for borrowers who pays their debt on time could assist in averting the problems of non-performing loans (NPLs) in Ghana's commercial banking industry.

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## Appendix 1

**List of Banks Operating in Ghana as of 30th April 2018**

Sr. No	Name of Bank	Year Incorporated	Ownership
1	1. Access Bank (Ghana) Limited	2005	Foreign***
2	Agricultural Development Bank (ADB) Limited	1965	Domestic
3	Bank of Africa Ghana Ltd	1997	Foreign***
4	Bank of Baroda (Ghana) Limited	2006	Foreign***
5	Banque Sahélo-Saharienne pour l'Investissement et le Commerce BSIC (Ghana) Limited	2006	Foreign***
6	Barclays Bank of Ghana Ltd.	1917	Foreign***
7	CAL Bank Limited	1990	Domestic
8	Ecobank Ghana Limited	1990	Foreign***
9	Energy Commercial Bank Ltd	2011	Foreign***
10	FBNBank (Ghana) Ltd	1996	Foreign***
11	Fidelity Bank Limited	2004	Domestic
12	First Atlantic Bank Ltd	1994	Domestic
13	First National Bank (Ghana) Ltd	1996	Foreign***
14	Ghana Commercial Bank (GCB) Bank Limited	1953	Domestic
15	GN Bank Limited	1997	Domestic
16	Guaranty Trust Bank (Ghana) Limited	2004	Foreign***
17	Republic Bank (Ghana) Ltd	1837	Foreign***
18	National Investment Bank Ltd	1963	Domestic
19	Prudential Bank Limited	1996	Domestic
20	Société General (Ghana) Limited	1975	Foreign***
21	Stanbic Bank Ghana Ltd	1999	Foreign***
22	Standard Chartered Bank (Ghana) Limited	1896	Foreign***
23	The Royal Bank Limited	2011	Foreign***
24	UniBank Ltd	1997	Domestic
25	United Bank for Africa (Ghana) Ltd	2004	Foreign***
26	Universal Merchant Bank Ltd	1972	Domestic
27	Zenith Bank (Ghana) Limited	2005	Foreign***
28	Sovereign Bank Limited	2015	Domestic
29	Premium Bank Limited	2016	Domestic
30	Omni Bank Ghana Limited	2016	Domestic
31	Heritage Bank Limited	2011	Domestic
32	The Construction Bank (Gh.) Limited	2017	Domestic
33	The Beige Bank Limited	2008	Domestic
34	GHL Bank Limited	2006	Domestic
35	ARB Apex Bank Ltd	2000	Domestic

**Source: Bank of Ghana, April (2018)**

**Note:** Licensed Bank: A bank that is legally registered with bank of Ghana to receive deposits and make loans to potential and credible clients of the banks. Banks may also provide financial services, such as wealth management, currency exchange and safe deposit boxes. **Representative Offices:** A representative office is an office created by an institution or a corporate body to do marketing and other non-transactional activities, generally in a country other than the home country where a branch office or subsidiary is unwarranted.

From Appendix 1 above, the total number of banks operating in the Ghanaian economy constitute only 35 banks for both domestic and foreign. From the [table 1](#), the foreign banks are marked with \*\*\*. Of these, 17 banks are foreign controlled banks representing only 48.57 percent of banks operating in Ghana as of 30<sup>th</sup> April 2018.

However, 18 banks constituting 51.43 percent are domestic banks meaning that the ownership rights of the banks are controlled by Ghanaian businessmen and women. The powers and executive rights of those banks are not owned or controlled by foreign banks.

## Appendix 2

### Similar Studies in the Review of Literature

Study	Period	Country	Methodology	Dependent Variables	Independent Variables	Findings
Yao <i>et al.</i> (2018)	2007–2016	Pakistan, 28 banks	the two-step generalized method of momentum (GMM) system estimator on an unbalanced dynamic panel			Their results reveal that the bank's profitability in Pakistan is explained by size, higher solvency, financial structure, operating cost, labor productivity, market power, and economic growth. They also found an inverted U-shape relationship between banks size and profitability.
(Serhat <i>et al.</i> , 2018)	1996- 2016	13 post-Soviet countries	fixed effects panel regression and the Generalized Method of Moments (GMM)			Loan amount, non-interest income and economic growth are significant indicators of profitability.
(Ferrouhi, 2017)		Morocco				Bank's specific variables such as funding liquidity, the size of the bank and its square are the long-term determinants of the performance of Moroccan commercial banks.
(Nkegbe and Ustarz, 2015)	2000-2010	Ghana	Panel Data Analysis	Banks Profitability Indicators: Return on Assets (ROA) Return on Equity (ROE) and Net Interest Margin (NIM)	Bank specific determinants: Liquidity, Operational efficiency, non-performing loans, and Markets share loan Industry specific determinants: Concentration Macroeconomic Variables: Gross Domestic Product, Broad Money supply, Consumer price index	The findings indicate that market share of loan is found to be positively related to performance, confirming the relative market power hypothesis and Ghanaian banks pass on their inefficiencies to their customers by raising their lending rates and lowering their deposit rates
(Nkegbe and Ustarz, 2015)		Ghana				Market share of loan is found to be positively related to performance, confirming the relative market power hypothesis and thus determines the banks profit in Ghana.
(Nouaili <i>et al.</i> , 2015)						Bank performance is positively related with capitalization, privatization, and quotation. While, bank size, concentration index and efficiency are negatively related with performance indicators (measured by net interest margin, LIQ, return on assets and return on equity).
(Selma <i>et al.</i> , 2015)	2007-2011	Western European Countries	System GMM Estimator	Net Interest Margin (NIM) and Return on average assets (ROAA)	Bank's Specific Factors: Capital adequacy, Credit risk, Liquidity	The results demonstrate that the capital ratio and the credit risk are the most relevant determinants of



					Macroeconomic factors: Economic growth (GDP growth rates) Inflation (CPI growth rates) Domestic credit to private sector	bank profitability.
(Rachna and Majumdar, 2014)	2009-2013	UAE	SURE Model	Bank's Performance Indicators: Return on Assets (ROA) and Return on Equity (ROE)	Bank's Internal Factors: CAMELS. Capital Adequacy (C) Asset Quality (A) Management Efficiency (ME) Liquidity Management (L) Sensitivity to market risk (S) External Factors: Real GDP Growth Rate Inflation Interest Rate Government Debt	The results reveals that CAMELS except liquidity and macroeconomic factors affects banks profitability (ROE and ROA) i.e., impact of capital adequacy is significantly positive while Management efficiency and sensitivity to market risk is found to have a significant negative impact on both ROA and ROE. GDP and interest rate has a significant negative impact on both ROA and ROE whereas contrary to our expectation, debt-GDP has a significant positive impact on ROA
(Nassreddine <i>et al.</i> , 2013)		Tunisia	Cognitive mapping techniques			Their findings reveals that microeconomics determinants or inherent performance variables such as size, control and credit quality are the important variables that determine the performance of bank.
Yong and Anchor (2013)	2003-2013	China	Auto- Regressive-Distributed Linear Specification and System GMM Estimator	Return on Assets (ROA)	Bank's Z-score and Stability inefficiency	The results show that higher insolvency risk/lower bank stability leads to higher profitability of Chinese commercial banks and that higher profitability leads to higher bank fragility.
(Mukaila and Mudashiru, 2013)		Nigeria	Cointegration and Error Correction Technique			Bank size and cost efficiency did not significantly determine bank profitability. However, credit risk (Loan Loss Provision-Total Assets) and capital adequacy (Equity-Total Assets) was found to be significant drivers which affected bank profitability both in the long run and short run, respectively. Also, while liquidity affected bank profitability in the short run, labour efficiency (Human Capital ROI and Staff Salaries-Total Assets) only affected bank profitability in the long run. But as for the external or macroeconomic variables which determined bank profitability, only Broad Money Supply growth rate was found to be a significant driver both in the long run and in the short run.
(Gunnarsdóttir and Mostepan, 2013)	2004-2012	14 European Countries that were least affected by 2008 global	Panel Data Regression	Return on Assets (ROA) and Return on Equity (ROE) Profit Margin	Bank characteristic variables: Leverage, Liquidity, Funds source, management,	The results suggest that variables that have a significant effect on profitability are leverage, required reserves, inflation, and GDP per capita. Leverage has positive effect

		economic crunch			Funds use management I, Funds use management II, Credit quality, and Deposit growth Macroeconomic variables: GDP per capita, Economic growth, Inflation Industry-specific variables: Tax rate and Required reserves	onROA and profit margin, but the effects on ROE are not significant. Inflation influences ROE, and GDP per capita only on the profit margin and that GDP per capita affect profit margin negatively.
(Rami, 2012)	2002-2009	Gulf Cooperation Council (GCC) countries	Panel Data Analysis	Return on Assets (ROA) and Return on Equity (ROE)	Bank's Internal Factors: Banks size Reserve to loan ratio Financial development Foreign Ownership Macroeconomic Variables: GDP and Inflation	The results reveals that bank's equity is relevant in explaining and increasing conventional banks profitability. The cost-to-income had a negative and significant impact on Islamic and conventional banks performance and GDP is positively correlated to bank's profitability, while inflation is negatively correlated to bank's profitability
(Souhir, 2012)	1990-2007	MENA Countries	Markov Switching model	Return on Assets (ROA)	Banks Size, Capitalization, Asset Quality, Management Efficiency and Liquidity ratio	Capitalization and asset quality are major determinants of banks profitability and should be considered attentively during recession since their implications are more pronounced during economic slowdowns.
(Kutsienyo, 2011)		Ghana				
(Yuqi, 2007)	1999-2006	UK	Multiple Regression Analysis	Return on Average Assets (ROAA)	Bank's Internal Factors: Liquidity Credit Risk Capital Strength or Capital Adequacy External Factors: Annual Growth Rate for Inflation GDP Interest Rate	The research identified that the impact of loan loss reserves has a negative impact on profit and statistically significant. This means that higher credit risks result in lower profits.

Source: Researchers' Elucidations, November 2018

### Appendix 3

#### Roots of Characteristic Polynomial

Endogenous variables: D(NIM) D(ROA) D(ROE)	
Exogenous variables: C D(AQR) D(KA) D(LMGT) D(MEFFI) D(Z_SCORE) D(GDP) D(INFCPI) D(FOREX)	
Lag specification: 1 1	
Date: 03/12/18 Time: 08:13	
Root	Modulus
0.634476	0.634476
-0.185840 - 0.169732i	0.251686
-0.185840 + 0.169732i	0.251686
No root lies outside the unit circle.	
VAR satisfies the stability condition.	

Source: Authors' Computation, Dec. 2018