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Assessing the Impact of Monetary Policy on the Financial Performance of Listed Commercial Banks in Ghana

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Abstract

The Central Bank of a country usually implements monetary policies comprising various instruments and strategies used to regulate the money supply, interest rates, and overall economic stability. A study was steered to assess the influence of financial policies on Ghana's monetary performance. The study employed secondary data spanning 2012 to 2022. A quantitative research approach and an explanatory research design stayed employed. According to the research, the viable financial institution standing is positively and expressively influence by the financial institution's open market operation. The open market operation for selling portray a negative substantial impact on the financial institution's performance. The bank of Ghana rate likewise had a negative and statistically substantial effect on the profitability of viable financial institution. The reserve requirement proportion has a statistically significant adverse effect on profitability.

The study recommended that central banks should consider adjusting their OMO strategies accordingly and should consider doing so in a timely and gradual manner. Also, Central Banks should consider implementing counter-cyclical measures alongside their OMO strategies. Central Banks should provide clear and transparent forward guidance regarding their future interest rate decisions. Commercial banks can anticipate rate movements better and adjust their strategies accordingly, reducing uncertainty and potential negative impacts. Finally, central banks can use reserve requirement ratios as a countercyclical tool. During periods of economic expansion, they could raise the ratios to curb excessive lending and prevent overheating. Conversely, they could lower the ratios during economic downturns to encourage lending and stimulate economic activity.

Keywords: *Open Market Operation(OMO), Financial Institution, Financial Institution Performance, Reserve Requirement, Economic Expansion, Lending, Economic Downturn, Economic Activity, Central Banks, Profitability, Cash Reserve Ratio (CRR).*

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1.0 INTRODUCTION

The study offers insightful knowledge on the institution of monetary policy on the financial performance of listed commercial banks in Ghana and the various monetary policy instruments and mechanisms that can be employ to ascertain bank performance. The primary motive of this profound study was undertaken to assess the impact of monetary policy on the financial performance of listed commercial banks in Ghana. Outcomes of this investigation are anticipated to enhance our present comprehension of how OMO, the CBR, and the RRR impact the financial outcome of banks, both within Ghana and on a global scale. The discoveries from this study make available cherished insights to management teams of commercial banks, enabling them to undertake necessary restructuring and enhancements to optimize the returns for stakeholders invested in commercial banks, particularly concerning the high-interest rates.

The results of this study would also be invaluable to researchers and scholars, as it will form a basis for further research. The students and academics will use this study as a basis for discussions on the monetary policy strategies adopted by the banking sector organizations in Ghana and their effect on bank performance. With the growing practice and increasing complexity of partnership arrangements, the public sector could also benefit from this study, as it provides valuable information on options for structuring finance that may be far removed from the sector's usual approaches.

Furthermore, this study will serve as a valuable resource for policymakers, commercial banks operating in Ghana, and the regulatory authorities overseeing the operations of commercial banks. It will assist in the formulation of policies aimed at guiding the operations of commercial banks within the Ghanaian context.

2.0 MATERIALS & METHODS

Evaluating an economy's robustness and efficiency necessitates a comprehensive analysis, with particular emphasis on the financial outcome of its banks, as pointed out by Lotto in 2019. Consequently, the banking and financial sector has garnered significant attention in modern accounting and finance survey. This heightened notice is because of the sector's growth in both the number of institutions and the magnitude of assets managed through their various activities. Despite the notable progress and successes achieved by these financial institutions, they still face challenges that demand persistent efforts. These efforts aim to enhance product and service quality, diversify offerings, and adapt to the quick global improvements.

Klaassen, in 2020, highlights` the multitude of threats facing financial institutions, including globalization, competition from nonbanking entities, stringent banking regulations, and the volatility of market dynamics. Interestingly, various banks and financial institutions have made strides in devising novel methods to improve their services. Assessing entity performance involves employing various ratios, with return on total assets and return on total equity being common metrics apply via banks to evaluate performance. Analysts widely employ these measures for forecasting trends and predicting corporate failures, as noted by Arkan in 2016.

Presently, research places greater emphasis on accounting ratios rather than simple ones like ROE or ROA. Accounting ratios serve as valuable tools for assessing banks' performance across various dimensions, including assets, revenue, profit, market value, workforce size, investments, and customer base, as stated by Al-Busaidi and Al-Muharrami in 2021.

However, it's worth noting that the fiscal discipline adopted by a country plays a pivotal function in shaping the financial operations of its financial institutions. Monetary policy can either stimulate or impede investment activities by determining the accessibility and affordability of credit. Most central banks view commercial banks as their main means of carrying out monetary policy, hence, find themselves susceptible to fluctuations in the macroeconomic environment. This mechanism by which central banks affect economic activity is the management of this rate. Lower rates lower borrowing costs, which promote economic growth, whereas higher rates aid in managing inflation. The Cash Reserve Ratio (CRR) stipulates that a definite proportion of a bank's total deposits must be maintained in its current account with the central bank, rendering these funds inaccessible for commercial or economic activities.

Numerous studies have emphasized the significant contributions of financial institutions and the banking sector to a country's growth, as highlighted by Park and Kim in 2020. Conversely, research by Abuka, Alinda, Minoiu, Peydró, and Presbitero in 2019 has underscored instances where banking and financial institutions have adversely affected individuals and

businesses due to unforeseen monetary policies. Therefore, this research examines the impact of money policies on banks' Profitability in Ghana.

3.0 METHODOLOGY

The chapter elucidates the studies methods utilized in the study, delving into the study type and rationale behind selecting these research methods. It furnishes comprehensive insights into the research approach, design, the target population, data sources, the sampling technique, and the rationale for its selection, as well as the data analysis approach adopted for the study. Furthermore, the study expounds upon the model specification, elucidating the chosen variables and the underlying rationale for their inclusion. Additionally, it provides a detailed account of the estimation strategy and the data collection process, encompassing data types and sources, data collection procedures, and the tools employed for data analysis.

3.1 Research Approach

A research approach refers to the systematic plan or strategy adopted by researchers to investigate a particular research problem or question. It involves a series of steps and methods that guide the collection, analysis, and interpretation of data (Manning and Stage, 2015). Research can be categorized into three main approaches quantitative, qualitative, and mixed research approaches (Creswell, 2014; Ishtiaq, 2019).

The study adopts a quantitative research approach. Quantitative research is a systematic empirical method used to collect and analyze numerical data to answer research questions and test hypotheses (Apuke, 2017). For the quantitative research approach, common methods of data collection include surveys, experiments, structured observations, and secondary data analysis. It relies on quantifying variables and measuring them with the goal of generalizing findings to a larger population (Halcomb and Hickman, 2015). Statistical methods are employed for analysis, aiming to unveil patterns, relationships, and trends (Apuke, 2017). These methods encompass widely utilized statistical techniques such as descriptive statistics (e.g., mean, standard deviation), inferential statistics (e.g., t-tests, ANOVA, regression analysis), and multivariate analysis (e.g., factor analysis, structural equation modeling) (Albers, 2017). The utilization of these statistical techniques facilitates the generation of objective and broadly applicable conclusions, thereby enhancing knowledge across diverse fields of study (Creswell, 2014).

The decision to utilize a quantitative approach serves as the fundamental rationale for the present study. Given the quantitative research methodology's reliance on statistical analysis, this study employs inferential statistics, specifically regression analysis, to scrutinize the collected data.

3.2 Research Design

Research design encompasses the strategic planning and execution of a study, involving the chosen methodology for research (Atmowardoyo, 2018). Tumele (2015) posits that research design can fall into the categories of exploratory, descriptive, or explanatory. In this particular investigation, an explanatory design was opted. This type of research methodology, as defined by Rahi (2017), aims to scrutinize cause-and-effect relationships among variables, seeking to elucidate the underlying factors and rationales that impact a specific phenomenon or behaviour.

The primary goal of explanatory research is to delve deeper into the reasons behind the occurrence of certain events by analyzing the interplay between independent and dependent variables. This design equips researchers with the ability to make predictions and formulate theories regarding the observed trends in the data (Benitez, Henseler, Castillo and Schuberth, 2020). Within the context of this study, an explanatory research design is applied to elucidate the influence of various monitory policies specified for the study.

3.3 Ethical Consideration

This research was carried with principles which aimed at protecting the privacy of every individual who, in the course of the research work was requested to provide personal or commercially valuable information about themselves (hereinafter referred to as a subject of the research). Before an individual becomes a subject, the person was notified of, the aims, methods, anticipated benefits and potential hazards of the research. No person becomes a subject unless the person is fully abreast or cognizant of the notice referred to in the preceding paragraph.

3.4 Research Methods

Researchers around the world have employed two main research approaches, namely the quantitative and the qualitative research methods (Adams et al., 2007). The qualitative method presents a descriptive and non-numerical approach to collect the information in order to present understanding of the phenomenon (Berg 2020). Adams et al., (2007) argue that qualitative method employs methods of data collection and analysis that are non-quantitative, aims towards the exploration of social relations, and describes reality as experienced by the respondents. Babbie (2020) points out that qualitative method is an active and flexible method that can study subtle nuances in the attitudes and behaviours for investigating the social processes over time. On the other hand, Adams et al., (2007); and Bryman (2012) point that the quantitative approach uses different types of statistical analysis and provides stronger forms of measurement, reliability and ability to generalize. Quantitative approaches refer to the research that is based on the methodology principles of positivism and neo-positivism and adheres to the standards of a stick research design developed prior to the actual research (Adam et al., 2007). Moreover, Berg (2004) argues that the quantitative method can deal with longer time periods with larger number of samples leading increasing the generalization capacity. However some researchers found that the qualitative approach suffers from a number of problems. First, it uses and selects a small sample which will not represent the entire population. Second, transparency and reliability are still low in qualitative methods (Berg, 2004). Finally qualitative methods are time consuming; it may result in inefficient tools to get adequate explanations (Berg, 2004). Quantitative research design is used in this study. The quantitative method of data collection was adopted because of the availability of data, convenience as well as the nature of the research design which required past and documented facts as basis for performance evaluation.

The justification for adopting a quantitative method in this study stems from three plausible reasons (i) the fact that existing theories make it easier to formulate hypotheses that can be tested using statistical tools; (ii) provides a framework for addressing the relationship among variables in the study; and (iii) useful for dealing a cause and effect relationship. Furthermore, this study applied deductive positivism approach whereby the pre-existing theoretical basis is identified and relied upon in developing the hypotheses, the empirical findings demonstrate whether the tested hypotheses are accepted or rejected. To achieve this objective, this study used the multiple regression as the main tool of analysis in which the researcher pursued the positivist understanding of the conduct of methodological processes that is "unaffected by the individual perceptual differences (Ardalan, 2012). Hair, (2009) stated that "the appropriate method of analysis when the research problem involves a single metric variable presumed to be related to two or more independent variables". Therefore multiple regression analysis is chosen as the main tool of analysis in this study. Multiple regression models is one of the most common methods of analysis that have been used by previous researchers (Cheng, E. W. (2001).

3.5.1The population of the Study

Population refers to the entire group of individuals, items, or elements that share a common characteristic and are of interest to the researcher. Those who are being studied represent the larger portion of the population to which the research was applied (Arias-Gomez,

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Villasís-Keever and Miranda-Novales, 2016). The primary focus of this study centres around the evaluation of how monetary policies have influenced the financial performance of commercial banks within the boundaries of Ghana. To achieve this research objective, it was imperative to select all the commercial banks that held licenses from the Bank of Ghana during the timeframe spanning from 2012 to 2022.

During this period, a total of three merger transactions occurred between different banks. These mergers involved the following institutions: First Atlantic Merchant Bank and Energy Commercial Bank, Omni Bank and Sahel Sahara Bank, and First National Bank and GHL Bank. In addition to these mergers, approximately 16 other banks managed to meet the new capital requirements stipulated by securing capital injections or by capitalizing their surplus income, all of which was the status quo as of the year 2022.

3.4.2 Sample and Sampling Technique

In order to conduct our research on the impact of monetary policies on the financial outcome of banks, we included all merged banks that had satisfied the new capital requirement set by the Bank of Ghana within the specified time frame from 2018 to 2022. Our selection criteria for commercial banks, whether they were local or foreign, consisted of three main factors: they must hold a valid license, comply with the new capital requirement, and be subject to regulation by the Bank of Ghana. Additionally, these banks were required to meet the new capital requirement consistently over the preceding five years (2018 to 2022). Finally, any commercial bank meeting these criteria and for which data was available and obtainable was eligible for inclusion in our research analysis.

3.4.3 Data Source

The source of data can be categorized into two main types: primary and secondary sources. The decision regarding which data source to utilize is heavily influenced by the data's accessibility to the researcher in relation to their specific research topic. Typically, if the required data is readily available, having been previously collected by a different researcher, it is considered a secondary data source. Conversely, when data is not readily accessible and needs to be intentionally collected firsthand or for a unique research experience, it qualifies as a primary data source (Ajayi, 2017).

In line with the explanations provided by Padungsaksawasdi, Treepongkaruna, and Brooks (2019), as well as Wooldridge (2016), when a researcher collects information that has already undergone one round of analysis before being incorporated into their present investigation, it falls under the category of secondary data. In the context of this research project, financial performance data was obtained from the annual reports of multiple commercial banks and the Statistical Service (GSS). Consequently, secondary data was utilized due to its dependable nature as a source of information.

3.4.4 Descriptive Statistics

Descriptive statistics have been widely used in academic research (Abdullah 2004). Descriptive statistics measure central tendency and dispersion. The most commonly used measures of central tendency are mean, mode and median. The mean is the most important measure of central tendency (Veal, 2017). The descriptive statistics used were the mean, maximum and minimum. The mean was calculated to measure the central tendency of the variables in 2009 and 2019. Descriptive statistics are also useful to make general observations about data collected. They report on the trends and patterns of data and provide the basis for comparisons between variables. In this study, descriptive statistics provided a comparison of changes in the data for 2012 and 2022. They show the extent to which financial engineering influence and the trends of banks performance.

3.4.5 Measurement of Variables

In this research, we assessed financial performance using the metric of return on assets (ROA), which is calculated by dividing a bank's revenue after deducting expenses by its total

assets. According to Padachi (2006), the most effective measure of a firm's profitability and performance is ROA, as it has the capability to connect performance to the total asset base.

Open market operations (OMOs) involve the buying and selling of government securities by a nation's central bank in the open market with the aim of managing the money supply, controlling interest rates, and achieving economic stability. The central bank engages in transactions related to government securities, such as treasury bills, treasury notes, and treasury bonds, in the open market. These transactions are conducted with authorized participants, including banks and financial institutions. As a result, this study utilized the treasury bill rates (both buying and selling) associated with the open market operations overseen by the Central Bank of Ghana during the period spanning from 2018 to 2022.

The Central Bank Rate (CBR), also referred to as the Policy Rate, represents the interest rate established by a country's central bank as a component of its monetary policy toolkit. It serves as the rate at which the central bank extends loans to commercial banks and other financial institutions. The CBR functions as a benchmark or reference rate that exerts influence on other interest rates within the economy. Consequently, this study incorporates the Bank of Ghana (BoG) interest rate data spanning from 2018 to 2022.

The Reserve Requirement Ratio (RRR), also known as the Reserve Ratio or Reserve Requirement, constitutes a monetary policy instrument utilized by central banks to influence the number of reserves that commercial banks are obligated to maintain in relation to their deposit liabilities. The reserve requirement stipulates the minimum percentage of a bank's total deposits that must be held in the form of reserves, either as cash reserves in their vaults or as deposits with the central bank. Therefore, this study examines the minimum percentage of total deposits held by commercial banks during the period from 2018 to 2022.

3.4.6 Data Analysis

Data collection involved the gathering and inputting of information into Excel, followed by exportation into Statistical Package of Social Sciences (SPSS) version 22 software. The analysis of the data encompassed the utilization of descriptive statistics, including mean, standard deviation, and skewness. These descriptive statistics were employed to assess a range of factors, encompassing OMO, the CBR, the RRR, and the banks' financial outcomes. Furthermore, a linear regression analysis was conducted to examine the influence of the central bank's open market operations, the central bank rate, and the reserve requirement ratio on the financial outcome of banks.

3.4.6.1Model Specification

The study employs the use of linear regression models to answer and analyze its research questions or hypotheses. The following are the models of the study:

$Model\ 1$

$$ROA_{it} = \beta_0 + \beta_1 OMOB_{i,t} + +\beta_2 OMOS_{i,t} + \eta_i + \delta_t + u_{it}$$

$Model\ 2$

$$ROA_{it} = \beta_0 + \beta_1 CBR_{i,t} + +\eta_i + \delta_t + u_{it}$$

$Model\ 3$

$$ROA_{it} = \beta_0 + \beta_1 RRR_{i,t} + \eta_i + \delta_t + u_{it}$$

Where,

$OMOB$ = Open Market Operation for buying

$OMOS$ = Open Market Operation for selling

CBR = Central Bank Rate

RRR = Reserve Requirement Ratio

ROA = Return on Asset

i denotes the i^{th} Rate at a given time period t.

η_i controls for unobserved central bank characteristics

δ_t controls for unobservable time heterogeneity

μ_{it} is the idiosyncratic error.

β_0 β_1, ... , β_n, are the coefficients of the independent variables.

Table 1: Description of Variables and their Measurement, Data and their Sources

Variables	Definitions	Measurement	Source
OMO	Open Market Operation	The rate of central bank purchases or sells government securities, such as treasury bills, in the open market	BOG website
CRR	Central Bank Rate	The interest rate set by a country's central bank as part of its monetary policy tools	BOG website
RRR	Reserve Requirement Ratio	The minimum percentage of a bank's total deposits that it must hold in the form of reserves, either as cash in their vaults or as deposits with the central bank	BOG website
ROA	Return on Asset	$\left(Net\ Revenue/_{Total\ Asset}\right) \times 100$	Annual Report of selected banks
ROA	Return on Equity	It is the rate of return on shareholders 'investment in the firm. Serves as a proxy for the measurement of the bank's profits.	BOG website

3.4.7 Model Estimation Technique

Since the study's model is simple linear panel multiple models where both cross-section and time unobservable heterogeneity is controlled for, we conducted Hausman test to decide whether we should estimate the study's model using either fixed effect estimator or random effect estimator.

3.4.8 Diagnostic Testing

R^2 gives the total variations in the selected commercial banks' financial performance which is explained by the independence variables in the model. The F-Statistics also give the overall statistical significance of the model where the selected financial performance is linearly related to explanatory variables employed. Thus, R^2 and F-Statistics analysis would be employed in our empirical analysis.

For the estimate and findings of the study to be consistent and reliable, we must make sure that the distribution of the residuals is normally distributed to make the estimator a feasible estimator to be used to estimate the model (Gebraeel, Lawley, Li and Ryan, 2005; Wooldridge, 2013). The main assumption is, the residual must follow a normal distribution with mean zero and constant variance. In this study, Jarque-Berra normality test is applied. This is the hypothesis statement:

H_0: Normality of the data

H_1: H_0 *is not true*

3.4.9 Test for Multi collinearity and Correlation

A pairwise correlation matrix is a valuable tool for assessing the strength and significance of relationships between variables within a model. It helps us understand the degree to which variables are correlated and the statistical significance of these correlations. In conjunction with

this, the Variance Inflation Factor (VIF) serves as a useful guideline for quantifying the impact of these correlations on regression analysis. The VIF reveals how much the variance of each coefficient is inflated, and as a general rule, an increase in VIF values tends to indicate a decrease in the reliability of regression results. Tabachnick and Fidel (2001) recommended a minimum tolerance value of 10 for VIF when the research model is not primarily focused on prediction. In such cases, a VIF value below 10 suggests that the independent variables are not significantly affected by multicollinearity. Hence the study will the present of multicollinearity using the variance inflation factor whiles pairwise correlation matrix would be used to test for correlation of the variables.

3.4.10Test for Heteroscedasticity

Heteroscedasticity is a problem where the variance of the residuals is not constant. The study test for this by checking that the residuals are fairly normally distributed, when the residuals follows normal distribution, it means the variance of the error term is constant and thus no present of heteroscedasticity. We also controlled for heteroscedasticity by using robust standard error in our regression estimation.

Drukker (2003) through simulation, reported that, the panel autocorrelation test proposed by Wooldridge exhibit a reasonable power and size properties when the sample size is fairly small. Below is the hypothesis statement:

H_0: *No first order autocorrelation*

H_1: H_0 *is not true*

A statistically significant test statistic indicates the presence of autocorrelation. When you fail to rejectH_0, the subsequent order of autocorrelation (second, third and the rest) all die off or decay by theorem.

In addition to the use of the above serial correlation Wooldridge test, since autocorrelation or serial correlation is a statistical term that describe the situation where the error term or the residuals correlate with its lagged values, the addition of the lags of each of the independent variables to the model in turn reduces the possibility of serial correlation.

The robustness of the study's models is tested using different econometric techniques and estimators to see if the results produce using those different econometric estimators will be consistent with the main estimator.

4.0 DATA ANALYSIS AND RESEARCH RESULTS

4.1 Data and Information Description

The primary aim of the research was to delve into how monetary policies influence financial performance within the context of Ghana. In pursuit of our overarching goal, we embarked on a multifaceted approach. Initially, our investigation delved into the influence of the Central Bank's OMO on the financial well-being of Commercial Banks. Furthermore, it probed the repercussions of the CBR on financial performance. In addition, we endeavoured to scrutinize the effects of RRR on financial performance.

In this chapter, the study present and engages in a thorough discussion of our estimation results. We begin by showcasing descriptive statistics related to the variables, conducting normality tests, and performing ANOVA tests. Finally, the study provides a comprehensive presentation and discussion of the results obtained from both correlation and regression analyses, all in the context of our research objectives.

4.2 Context of Research Sites

The data was collected from the Bank of Ghana online database. The researcher with the help of three research assistants made use of the data derived from the Bank of Ghana online database to do the analysis of the study Also, additional information was retrieved from the websites of the selected commercial banks. This information, return on assets (ROA), was important to measure the profitability of the selected commercial banks after financing major

projects which requires a lot of financial support. The extraction of the secondary data from the various websites of the selected commercial banks was done by the principal researcher.

4.3 Analysis of Data

4.3.1 Descriptive Statistics

This presents some basic measures of central tendencies such as mean and standard error of the mean. Other descriptive were the minimum and maximum values. Table 2 gives a summary statistic of the minimum, maximum, mean and standard error for all the variables observed in the study. The analysis will mainly focus on the variables of interest.

Table 2: Descriptive Summary Statistics of the Variables

	Mean	Std. Deviation	min	max
ROA	0.028	0.147	-0.02	0.31
OMO S	19.2942	5.047	16.10	35.90
OMO B	16.036	3.280	13.87	26.41
CBR	16.754	4.480	13.46	32.83
RRR	7.088	0.877	4.75	7.75

Source: Author's Own Construct 2024

Table 2 reveals that the mean performance score of commercial banks operating in Ghana stands at 0.03. This is associated with a dispersion of -0.02, a minimum score of 0.31, and a maximum score of 48. This shows that on average commercial banks is performing poorly since their average return on asset is a single digit.

Again, it can be seen from Table 2 that the average central bank open market operation for selling was approximately 19% with a minimum of 16 and a maximum of 36. This indicated that, on average central bank open market operation for selling is high since their average open market operation for selling was a double digit. Similarly, an average central bank open market operation for buying was 16.04 with a dispersion of 3.28 and minimum of 13.87 and a maximum of 35.90. comparatively, the percentage of central bank selling of open market operations always outnumbered its buying throughout the period of study.

Also, it was reported that the average central bank rate charge under the period of study is 16.754 with a minimum of 13.46 and a maximum of 32.83. This is an indication that the central bank rate charge on commercial banks in the country is very high since its average value is more than a single digit.

Finally, from Table 2, the average proportion of the central bank reserve requirement ratio in Ghana is 7.09 with a minimum of 4.75 and a maximum of 7.75. This shows that there is a low proportion of central bank reserve requirement ratio in Ghana since its maximum rate is a single digit.

4.3.2 Central Bank of Ghana's Open Market Operation (OMO) and commercial banks' performance in Ghana

The first objective assesses the OMO of the Central Bank and its impact on Ghanaian commercial banks. In order to achieve the above objective, multiple regression analysis was used to assess the impact of the Central Bank's open market operations on financial performance. In using multiple linear regression, the following assumptions were tested; multicollinearity, correlation, and normality test using One Way Analysis of Variance (ANOVA). The findings are presented in Tables 3 to 6.

Table 3 gives a clear indication of diagnostic checks for linear regression analysis. It shows the indicators for open market operations and collinearity statistics (tolerance and VIF).

Table 3: A Multicollinearity Test of the Independent Variables

	Collinearity Statistics

Model	Tolerance	VIF
open market operations for Buying	0.967	1.037
open market operations for selling	0.469	2.050

a. Dependent variable: financial performance (return on asset)

Source: Author's own calculation

Table 3 reveals that the largest value of VIF is 2.050 which is less than 10. This means that the independent variables are fit to be used for the study. Also, it is evident in the Tolerance values since none of the values are below 0.01 then all the indicators are fit to be used for the study.

As mentioned in Chapter Three, for the estimates and findings of the study to be consistent and reliable, we must make sure that the distribution of the predictor's values is significant to make the study's estimator a feasible estimator to be used in estimating the model (Wooldridge, 2011). One of the main assumptions for the use of estimation techniques is about the significance of the predictor variables. The predictor values must all be significant so as to make a good prediction. In this study, ANOVA test is applied with hypothesis statement: H_0: $Non-significant$ of the data andH_1: H_0 $is\ not\ true$.

Table 4 shows the ANOVA test for commercial banks' open market operation and financial performance. It shows in each case the model sum of squares, degree of freedom, mean square, F-test and significance value

Table 4: ANOVA showing the significance of the predictor variables

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	0.171	2	0.085	4.232	.017[b]
Residual	1.936	96	0.02		
Total	2.107	98			

a. Dependent Variable: ROA, @0.05

b. Predictors: (Constant), OMOS, OMOBS

Table 4 presents the diagnostic statistics for the multivariate regression. In Table 4, the variables have joint significance at 0.017 significance, indicating that the model explains the dependent variable well. Studies have shown that non-significance indicates a model failure, requiring a rerun or model specification. Once more, the Analysis of Variance (ANOVA) table reveals that all the independent variables being examined are statistically significant at a significance level of p = 0.017, which is less than 0.05. This indicates that the collected data accurately reflects the actual situation at the central bank and has not been manipulated.

4.3.3 Correlation Analysis

Table 5 uses a correlation matrix to show how the variables are correlated. Based on statistical and economic research, false regression findings may arise from a relatively high correlation level between the independent and dependent variables. Table 5 presents a relationship between the open market operations (open market sales and purchases) and financial performance (return on asset) of Ghana's central banks.Table 5: Correlation Matrix for dependent and independent variables

Variables	1	2	3
(1) Return on Asset	1.000		
	(0.048)		
(2) open market operation for buying	*	1.000	

(3) open market operation for selling	(-0.057) *	(0.201)	1.000

*Corr (r) is sig. @ 0.05 level (2-tailed).

Table 5 indicates the correlation coefficient between open market operations for buying, open market operations for selling and commercial banks' financial performance (return on asset). The results indicate that there is a weak correlation between open market operation for buying (COR= 0.048), open market operation for selling (COR=0.057) and the financial performance of commercial banks. Overall, there is a weak correlation between open market operations and the financial performance of commercial banks. This is an indication that there is an expectation of an effect of the independent variables on the dependent variable (financial performance).

Regression analysis is shown in Table 6 for the effect of open market operation. The following variables such as open market operation for buying and selling were considered for the study and have been summarized in Table 6 showing the predictors coefficients, standard error of the coefficients, t-statistics and the significance of the model (p-values).

Table 6: Multiple Linear Regression Analysis for the effect of open market operation on financial performance

Model	I	Std. Error	t	Sig.
(Constant)	1.404	0.497	6.98	0.006
Open market operation (buying)	0.263	0.091	2.86	0.005
Open market operation (selling)	-0.402	0.141	-2.851	0.005

Dependent variable: financial performance (return on asset), R-square = 0.081

R^2 explains the degree of variance in the response variable that is explained by the independent variables, as shown in Table 6. The findings show that independent variables of open market operation for buying and selling account for 8.1% of the variation in the financial performance of commercial banks

In Table 6, an assessment was conducted to examine how OMO impact the commercial banks' financial outcomes. The investigation yielded a noteworthy finding, indicating that open market operations indeed have a significant effect on the financial performance of these banks (Beta=1.404; p=0.006<0.05).

Furthermore, the study's results illustrated a positive and substantial impact of central bank OMO related to purchases (Beta=0.358; p=0.020<0.05) on financial outcomes. This demonstrates that when the central bank engages in open market purchases, it positively influences and enhances the financial performance of these banks. This is due to the fact that such actions lead to the crediting of accounts held by commercial banks, consequently augmenting their reserves.

This additional reserve balance gives commercial banks more capacity to lend to consumers and businesses, thereby improving their financial performance. Thus, the injection of money from the central bank improves the liquidity position of commercial banks. With more liquidity, banks can more easily meet their daily operational requirements and are better equipped to respond to unexpected cash demands from depositors.

However, there is a negative and significant effect of open market operation for selling (Beta=-402; p=0.005<0.05) on the commercial banks' financial well-being. This suggests that when the central bank sells securities to commercial banks, it debits the accounts of those banks, reducing their reserves. This reduction in reserve balances potentially limits the amount of money that banks have available for lending leading to a decrease in the financial outcomes of banks. Thus, the removal of money from the financial system reduces the overall liquidity available to commercial banks. This could make it more challenging for banks to meet their daily

operational requirements and respond to unexpected cash demands affecting their financial performances

4.3.4 How the Central Bank Rate (CBR) influences financial performance

The second goal is centered on exploring how the Central Bank Rate (CBR) impacts financial performance. To accomplish this aim, we utilized a basic linear regression analysis to evaluate the influence of the Central Bank Rate (CBR) on financial performance. In using simple linear regression, the following assumptions were tested; Correlation and ANOVA test. The findings are presented in Tables 7 to 10.

5.3.3Correlation, and ANOVA Test for independent variables.

Table 6 depicts the correlation among the variables using a correlation matrix. According to statistics and econometrics, when the correlation level between the independent and dependent variables is relatively high, it can cause spurious regression results analysis. Table 7 shows a correlation between Central Bank Rate (CBR) and financial performance in Ghana.

Table 7: Correlation Matrix for dependent and independent variables

Variables	1	2
(1) Return on Asset	1.000	
(2) central bank rate	(-0.001) *	1.000

*Correlation is significant at the 0.05 level (2-tailed).

Source: Authors' own construct

Table 7 indicates the correlation coefficient between the central bank rate and commercial banks' financial performance (return on asset). The results indicate that there is a very weak correlation between the central bank rate (COR=- 0.001) and the financial outcomes of banks. Overall, there is a very weak correlation between central bank rates and the financial performance of commercial banks. This is an indication that there is an expectation of an effect of the independent variables on the dependent variable (financial performance).

Additionally, for the estimates and findings of the study to be consistent and reliable, we must make sure that the distribution of the predictor value is significant to make the study's estimator a feasible estimator to be used in estimating the model (Wooldridge, 2011). One of the main assumptions for the use of estimation techniques is about the significance of the predictor variables. The predictor values must be significant so as to make a good prediction. In this study, the ANOVA test is applied with hypothesis statement: H_0: $Non-significant$ of the data andH_1: H_0 $is\ not\ true$.

Table 8 shows the ANOVA test for CBR and financial outcomes banks in Ghana. It shows in each case the model sum of squares, degree of freedom, mean square, F-test and significance value

Table 8: ANOVA test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.271	1	4.271	14.695	.000[b]
	Residual	13.660	47	0.291		
	Total	17.931	48			

a. Dependent Variable: financial performance (ROA)

b. Predictors: (Constant), central bank rate

In Table 8, diagnostic statistics are presented for the linear regression. Table 8 indicates that the variables are jointly significant at 0.000 significance and that the model explains the dependent variable well. Non-significance means the model failed, which requires rerunning or

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respecifying. Once more, the Analysis of Variance (ANOVA) table demonstrates that the independent variables being examined hold statistical significance at a level of ($p = 0.000 < 0.05$), providing evidence that the gathered data accurately reflects the situation within central banks without any manipulation.

4.4.3 Model Summary

Table 9 shows the model summary, indicating regression, regression square, adjusted regression square and standard error of the estimate.

Table 9: Model Summary

Model	Regression	R-Square	Adjusted R-Square	Std. Error of the Estimate
1	.487[a]	.237	.222	0.53911

a. Predictors: (Constant), financial performance (ROA)

Table 9 shows that the independent variables cause a lot of variation in the dependent variable. According to the results, the independent variable (central bank rate) explains 23.7% of the variation in financial performance (return on asset). Remaining 76.2% of variations were explained by residuals.

Table 10 provides the regression analysis for the influence of the CBR on financial outcome. It shows the variables for the model, standardized and unstandardized coefficient, t-statistics and the significance of the model.

Table 10: Linear regression analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.550	0.301		8.464	.000
Central bank rate	-0.072	.019	-.488	-3.833	.000

a. Dependent Variable: financial performance (return on asset)

The study evaluates how the financial outcome of banks in Ghana is impacted by the central bank rate. This was assessed with the standardized coefficient as shown in Table 10. It was discovered that there is a negative and statistically significant effect of the central bank rate on financial outcomes (Beta=-0.072; p=0.000: $p<0.05$). Thus, from the perspective of the standardized beta approach, it can be concluded that an increase in the central bank rate causes a 7.2% significant decrease in the financial outcomes. Higher central bank rates mostly lead to negative market sentiment, affecting investor confidence in the economy and financial institutions. This can impact stock prices and investor perception of the bank's financial health. Additionally, as central bank rates rise, the value of fixed-income assets such as bonds and mortgage-backed securities can decrease. This can lead to potential losses on the bank's investment portfolio leading to poor performance of banks in Ghana.

The third objective examines the influence of the reserve requirement ratio on financial outcome. Therefore, the study uses a simple linear regression analysis to assess the effect of the

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reserve requirement ratio on financial performance. In using simple linear regression, the following assumptions were tested; Correlation and ANOVA test. The findings are presented in Tables 11 to 14.

Table 11 however, depicts the correlation among the variables using a correlation matrix. According to statistics and econometrics, when the correlation level between the independent and dependent variables is relatively high, it can cause spurious regression results analysis. Table 11 shows a correlation between the reserve requirement ratio and financial performance in Ghana.

Table 11: Correlation Matrix for dependent and independent variables

Variables	1	2
(1) Return on Asset	1.000	
(2) Reserve requirement ratio	(-0.100) *	1.000

*Cor (r) sig. @ 0.05

Table 11 displays the correlation coefficient between the reserve requirement ratio and the financial outcomes of banks, specifically the return on assets. The findings suggest a notably weak correlation between the reserve requirement ratio (COR = -0.100) and the financial performance of commercial banks. In summary, the data underscores the presence of a very weak correlation between the reserve requirement ratio and the financial performance of commercial banks. This is an indication that there is an expectation of an effect of the independent variables on the dependent variable (financial performance).

More so, for the estimates and findings of the study to be consistent and reliable, we must make sure that the distribution of the predictor value is significant to make the study's estimator a feasible estimator to be used in estimating the model (Wooldridge, 2011). One of the main assumptions for the use of estimation techniques is about the significance of the predictor variables. The predictor values must be significant so as to make a good prediction. Table 12 shows the ANOVA test for the reserve requirement ratio and financial outcomes of banks in Ghana. It shows in each case the model sum of squares, degree of freedom, mean square, F-test and significance value

Table 12: ANOVA test

Variables	Sum of Squares	df	Mean Square	F	Sig.
Regression	.071	1	.071	4.145	.043[b]
Residual	2.651	154	.017		
Total	2.722	155			

a. Dependent Variable: financial outcome (ROA)

b. Predictors: (Constant), reserve requirement ratio

Table 12 presents the diagnostic statistics from the linear regression. According to Table 12, the variables have a joint significance of 0.043, indicating that the model explained the dependent variable well. Once more, the Analysis of Variance (ANOVA) table clearly indicates the significance of the independent variables being considered, with a p-value of 0.043, which is less than the conventional significance level of 0.05. This suggests that the data collected faithfully represents the real situation within the central banks, without any manipulation.

5.0 CONCLUSION

When analyzing the influence of the OMO on the financial outcome of banks, it becomes evident that these operations have distinct effects. The central bank's practice of buying securities has a positive impact on banks' financial outcomes. This occurs because when the central bank purchases securities from banks, it adds credits to their accounts, thereby increasing their reserves. This augmented reserve balance enhances the capacity of commercial banks to extend loans to both consumers and businesses, ultimately bolstering their financial performance. Conversely, the central bank's OMO involving the sale of securities have a negative impact on the financial outcomes of banks. This phenomenon is observed as, when the central bank sells securities to commercial banks, it debits the accounts of these banks, consequently reducing their reserves. This decrease in reserve balances potentially constrains the funds available for lending, leading to a decline in the financial outcome of banks.

In relation to the impact of the CBR on financial outcome, it can be concluded that there is a negative and statistically significant effect of the central bank rate on the financial outcomes of banks. It is suggested that higher central bank rates can lead to negative market sentiment, affecting investor confidence in the economy and financial institutions. This can impact stock prices and investor perception of the bank's financial health. Additionally, as central bank rates rise, the value of fixed-income assets such as bonds and mortgage-backed securities can decrease. This can lead to potential losses on the bank's investment portfolio leading to poor performance of banks in Ghana.

When examining the influence of the reserve requirement ratio on financial outcomes, we can draw the conclusion that there exists a notable and adverse impact of this ratio on the financial performance of banks. The implication is that as the central bank elevates the reserve requirement ratio, banks find themselves compelled to allocate a greater proportion of their deposits into reserves, thereby constricting the pool of funds available for lending. Consequently, this restriction can diminish the bank's capacity to generate interest income from loans, which ultimately affects its profitability and overall financial performance. Moreover, a heightened reserve requirement ratio results in a larger share of a bank's funds being locked in low- or non-interest-bearing reserves held with the central bank.

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