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A Study of the Effect of Changes in the Statutory Reserve Ratio Requirement on Commercial Banks Profitability in Zambia

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ABSTRACT
The study was aimed at studying the effects of changes in the Statutory Reserve Ratio Requirement on commercial banks profitability in Zambia between 2007 to 2017. Time series data, namely, monthly data was used throughout the 11-year study. The study included data from all Zambian commercial banks operating from 2007 to 2017. The study used EViews version 10, for data analysis. Statutory reserves and bank profitability in Zambia were studied using the Autoregressive Distributed Lag (ARDL) model. This research sought to objectively determine how statutory reserves affect bank performance. Performance was measured by ROA. The study found an inverse relationship between statutory reserves and financial performance of commercial banks in Zambia. Beyond statutory reserves, the research also considered the impact of other bank-specific variables on profitability. Specifically, it observed that inflation and open market operation balances exerted negative impact on the commercial banks' performance.
Additionally, the study unveiled an important aspect related to the time horizon for adjustment. The speed of adjustment from short-run dynamics to long-run equilibrium was estimated at approximately 62%. After changes in statutory reserves and other variables, Zambian banks tend to reach a long-term profitability equilibrium point. These findings affect Zambia's banking industry and regulators. It emphasises the need to balance regulatory requirements like statutory reserves with commercial bank profitability. This research advances monetary economics and lays the groundwork for future research due to the changing financial industry and regulatory environment.

Keywords: *statutory reserve requirement (srr), financial profitability, return on assets, commercial banks, bank of zambia*

I. INTRODUCTION

The Bank of Zambia (BOZ) controls money flow in Zambia with contractionary or expansionary monetary policy (BOZ, 2018). The BOZ controls all commercial banks and sets Zambia's monetary policy. BOZ sells treasury bills and bonds to increase and decrease the Statutory Reserve Requirement Ratio (SRR), Policy Rate (PR), and Open Market Operation (OMO) to control the money supply (BOZ, 2018). Based on market conditions and borrower risk tolerance, monetary policy affects commercial banks (Branson, 2015). Monetary policy affects commercial banks' interest rate spread, which is the difference between deposit and lending interest. Statutory Reserve Ratio Requirement restricts and loosens domestic lending (Montoro and Moreno, 2011). Central banks drain domestic liquidity surpluses with this cheaper monetary policy instrument instead of OMOs (Adebayo & Ayodeji, 2015). Central banks require banks to reserve a minimum percentage of deposits. Private credit and securities are not allowed with these deposits. Therefore, higher reserve requirements lower money multiplier for a given monetary base. If the central bank targets quantities and maintains the monetary base, increasing reserve requirements has the same effects as a conventional monetary contraction. Interest rates rise due to reserve requirements. Banks must raise deposit rates to meet reserve requirements without cutting credit. According to IMF (2012), higher marginal funding costs lead to increased lending and interest rates. However, if the central bank controls the interest rate and money price, increasing reserve requirements may have different impacts. The central bank must boost the monetary base to offset the reserve requirement hike's contractionary impacts and prevent policy rate divergence. Reserve requirements are neutral if the central bank targets interest rates in simple models (Agwu & Godfrey, 2020). Monetary policy controls money supply through the Central Bank's reserve ratio (Ng'ang'a, 2017).

As the monetary side of economic policy, monetary policy must be integrated with other tools (Jadah, et al., 2020). Monetary policy's stabilisation effects differ per economy (Younus & Akhtar, 2011). Most central banks cut inflation and other macroeconomic metrics during global financial crises. The 2007–2009 global financial crisis led many central banks to adjust

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their monetary policy instruments to avoid bank runs and other concerns that damaged the global financial system and local levels, especially in wealthy countries afflicted by the subprime mortgage crisis (IMF, 2012). Although real growth could have been higher and employment affected, Zambia was not significantly harmed by the 2008-09 global financial crisis (Ndulo, et al., 2012). The country sustained decade-long growth and macroeconomic stability (Ndulo, et al., 2012). We had international reserves, controlled inflation, and low debt.

Economic structure changes, money and capital market development, economic advances, and economic conditions cause monetary policy disparities (Oudat & Ali, 2020). Most countries, including Zambia, regulate money supply with reserve ratios for financial and macroeconomic stability. To effectuate this regulation, the Bank of Zambia may regulate the reserve account transfer amount, computation method, form, and any other item. Since reserve ratio requirements vary by country, they may affect bank profitability. Industrialised central banks have a single interest rate structure, whereas Zambia's does not. Instead, the Bank of Zambia (BOZ) mixes numerous policy instruments. Economic growth has affected Zambia's monetary policy. The Bank of Zambia's policy tools include price-based instruments like the 2012 policy rate and open market operations and quantity-based measures like the statutory reserve ratio. Changes in Zambia's key policy tool, the SRRR, restrict or loosen bank lending and monetary policy. The statutory reserve ratio limits commercial banks' lending, affecting their profitability. A higher ratio reduces lending, while a lower ratio promotes it. This study examines how statutory reserve requirement ratio changes influence Zambian commercial banks.

In recent years, the Bank of Zambia has been changing the statutory reserve ratio (SRR) requirement. This practice has been found to be a major hindrance on commercial banks' financial performance in other countries (Chapswike, 2016). The Bank of Zambia (BOZ) most recent adjustment in the reserve requirement ratio was on 14th December 2019 when the ratio was increased by 4 percentage points from 5.0% to 9.0% (Bank of Zambia (BOZ) , 2019).

Adjustment of the SRR is just one of several changes that have occurred over the past years, when BOZ has tightened and relaxed monetary pools in the wake of economic changes in Zambia. Bankers Association of Zambia (BAZ) expressed concern that this upward adjustment in the SRR requirement would result in an increase in the cost of borrowing from commercial banks, which would have major implications on the demand for funds from deficit units or borrowers (Bankers Association of Zambia (BAZ) , 2019).

An increase in the SRR widens the spread between the deposits and lending rates, hence, this higher spread makes it less attractive for investors to lend to domestic banks at the same time makes it expensive for the domestic sector to borrow from banks (Chapswike, 2016). A study in China by Haiyang (2012) found that changing reserve ratios does not have any direct effect on controlling surplus liquidity, preventing inflation or controlling the lending activity. Abid & Lodhi (2015) stated that whenever the reserve requirements increased, it acts as a tax burden on bank deposits. This is due to the fact that financial intermediation becomes more costly, spreads between lending and deposit rates rises (Kariuki, 2013).

Considering the aforementioned, the study examines the effect of changes in the Statutory Reserve Ratio Requirement on commercial banks' financial performance in Zambia.

II. EMPIRICAL LITERATURE REVIEW

Statutory Reserve requirements represent the minimum percentage of deposits that banks are required to hold as reserves with central banks (Abid & Lodhi, 2015). This portion of deposits cannot be used to expand private credit or buy securities. Consequently, increased reserve requirements reduce the money multiplier (Al-Homaidi, et al., 2018). As reserve requirements increase, the broad money supply will decrease in response. According to Ndiritu (2017), financial performance is a measure of how companies execute their activities to reach their financial objectives. Financial performance measures assess the success of companies in terms of their financial returns. This is accomplished through the utilisation of different assessment techniques and the analysis of financial indicators (Gwaya and Mungai, 2015).

In a study conducted by Kithitu (2012), the author examined the data from financial statements to analyse the impact of mergers and acquisitions. Measuring financial performance involves considering various factors, including Return on Equity (ROE), Return on Assets (ROA), and Earnings per Share (EPS). Return on Assets (ROA) ratio evaluates a company's performance by comparing its profit (net income) to the capital it has invested in assets (CFI, 2021). The higher the rate of return, the more effective and efficient management is in utilising economic capital. The ROA is a significant ratio utilised by analysts and financial experts to assess a company's profitability (CFI, 2021).

Several studies have investigated the impact of various factors on the profitability of commercial banks across different regions. Hoque et al. (2020) focused on the Cash Reserve Ratio (CRR) in Bangladesh, finding a negative relationship between CRR and profitability metrics such as return on assets (ROA), return on equity (ROE), and return on investment (ROI). Increased CRR was associated with decreased profitability. Similarly, Toro et al. (2020) examined the performance of Nigerian deposit money institutions and found that while liquidity and loan-to-deposit ratios significantly influenced net profit margin, the impact of interest rates and cash reserve ratios was minimal.

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Bekhet et al. (2020) explored internal and external factors affecting Jordanian commercial banks' profitability. They found that bank size and diversification positively influenced profitability, while factors like credit risk and operational risk had negative impacts. External factors, such as financial development and inflation, also played a role. Further studies, like Phan et al. (2020) in Vietnam and Jadah et al. (2020) in Iraq, have delved into similar themes, highlighting the complex interplay between bank-specific, macroeconomic, and regulatory factors on bank profitability.

Additionally, research by Prasanto et al. (2020) in Asia and Alfadli and Rjoub (2020) in the Gulf Cooperation Council (GCC) region focused on specific banking sectors, uncovering factors like loan-to-deposit ratio and capital adequacy ratio as key determinants of profitability. Nguyen (2020) investigated the impact of adequate bank capital on Vietnamese banks' profitability within the context of the Basel II Accord, shedding light on the importance of regulatory frameworks. Collectively, these studies underscore the multifaceted nature of bank profitability, which is influenced by a myriad of internal and external factors that vary across regions and banking systems.

III. THEORETICAL LITERATURE REVIEW

Foundations of Financial Markets Theory

Modigliani's book, first published in 1971, is a thorough examination of the principles that underpin financial markets and the theories that form our knowledge of their dynamics (Fabozzi, et al., 2010). At its core, the book "Foundations of Financial Markets Theory" explores into the Modigliani-Miller theorem, a seminal contribution co-developed by Modigliani that revolutionised our understanding of capital structure and the relationship between a firm's value and its financing decisions (Modigliani & Papademos, 1980). While Modigliani's theory does not particularly address the effect of changes in statutory reserve ratios requirement on commercial bank profitability, it does give a theoretical platform for understanding the broader economic and financial ramifications. The capital structure propositions of Modigliani and Miller provide insights into how enterprises, particularly banks, make financing decisions. Changes in statutory reserve ratios can have an effect on a bank's capital structure by influencing retained earnings and capital adequacy.

Liquidity Preference Theory

The Liquidity Preference Theory, attributed to economist John Maynard Keynes, explains how individuals and businesses decide whether to hold onto cash or invest in interest-generating assets (Dalziel, 1996). People prefer to keep some wealth in liquid assets for unforeseen expenses and transactions (de Carvalho, 2015). Changes in reserve ratio requirements by central banks, like the Bank of Zambia, affect the economy and bank behavior. Lowering the reserve ratio allows banks to lend more, increasing money circulation and potentially lowering interest rates. According to the theory, lower rates encourage investment in interest-bearing assets, boosting economic activity (Bibow, 2013). Conversely, raising the reserve ratio reduces available money, potentially increasing interest rates (Tobin, 1947). The liquidity preference theory is a cornerstone of macroeconomics, offering insights into the dynamics of financial decision-making and their broader economic impacts. Understanding this theory is crucial for policymakers and economists alike.

Interest Pass through Theory

The Interest Rate Pass-Through Theory explores how changes in central bank interest rates affect various sectors of the economy (Gigineishvili, 2011). Originating from monetary economics and central banking, the theory has evolved over time through contributions from economists and central bankers (Gigineishvili, 2011). Central banks, such as the Federal Reserve and the European Central Bank, implement monetary policy to influence interest rates (Sander & Kleimeier, 2006). Similarly, the Bank of Zambia adjusts its policy rate to achieve specific goals, like managing inflation (Sander & Kleimeier, 2006). Reserve requirement adjustments by the Bank of Zambia can impact how changes in policy rates affect retail interest rates, potentially lowering borrowing costs (Kleimeier & Sander, 2004). The Interest Rate Pass-Through Theory also sheds light on the relationship between central bank rate changes and commercial bank profitability (Kleimeier & Sander, 2004). Reserve requirement adjustments can influence how effectively commercial banks transmit central bank rate changes to lending and deposit rates (Kleimeier & Sander, 2004). Understanding these mechanisms is vital for contemporary monetary policymaking (Akomolafe et al., 2015), especially given the significance of the interest rate channel in inflation-targeting frameworks (De Bondt, 2002). Adjustments in reserve requirements can impact the transmission of policy rate changes, affecting interest rate spreads earned by banks (Sander & Kleimeier, 2006). This, in turn, influences borrowing costs and, ultimately, bank profitability (Sander & Kleimeier, 2006).

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IV. RESEARCH METHODOLOGY

Research Design

The study was based on time series research design because of the historical aggregated data that was collected from all commercial banks from the Bank of Zambia. When examining the effects of changes in statutory reserve requirements on bank profitability, a time series design is useful because it allows us to observe both immediate and delayed impacts. This design helps us understand how the effect changes over time and analyse the temporal dynamics involved.

Time series analysis is a useful tool for determining causal relationships between variables (Bartos, et al., 2023). By carefully examining the patterns of changes in statutory reserve requirements and their subsequent effect on bank profitability, one can draw more insightful conclusions regarding the cause-and-effect relationship between these two variables.

Population of the Study

The populations of interest included all commercial banks that operated in Zambia between 2007 and 2017. As of 2017, the banking sector in Zambia had a total of 19 banking corporations (BoZ, 2017). The period of analysis was chosen based on data availability and its sufficiency to provide reliable results based on quantitative and statistical analysis.

Sample and Sampling Procedure

Non-probability sampling technique was adopted specifically purposive sampling technique because the researcher with focus on all commercial banks in Zambia that were operational during the study period, 2007 to 2017, which witnessed an increase in commercial banks and also a decrease later owing to mergers and acquisitions.

Data Collection

The data was collected based on published financial historical data from financial Statements, Commercial Banks and Bank of Zambia (BOZ) Monetary Policy statements. Annual statutory reserve ratio requirement was obtained from the Bank of Zambia (BOZ) website. Profitability ratios will be computed from the same data. Other sources of secondary information included dissertations, journals, text books and Bank of Zambia (BOZ) reports.

i. Statutory Reserve Requirement (SRR)
ii. Total Assets (TA)
iii. Return on Assets (ROA)
iv. Open Market Operations (OMO)
v. Average Lending Rate (ALR)

Data Analysis

The data collected was analyzed through Eviews version 10, this package was used to carry out multiple Regression analysis and to generate the correlation coefficient, the coefficient of determination and finally to test the hypotheses by using the t-test and the ANOVA test. The multiple regression analysis was carried out on a period of eleven (11) years (2007 to 2017), with monthly data being used for the period above. The data collected was analyzed through Eviews version 10, in order establish the effect of statutory reserves on commercial banks profitability in Zambia.

Model Specification

The study employed the Autoregressive Distributed Lag (ARDL) model. The ARDL cointegration approach was developed by Pesaran and Shin (1999) and Pesaran et al. (2001). It has three advantages in comparison with other previous and traditional cointegration methods. The first one is that the ARDL does not need that all the variables under study must be integrated of the same order and it can be applied when the underlying variables are integrated of order one, order zero or fractionally integrated. The second advantage is that the ARDL test is relatively more efficient in the case of small and finite sample data sizes. The last and third advantage is that by applying the ARDL technique we obtain unbiased estimates of the long-run model (Harris and Sollis, 2003).

However, Models of this type are likely to have difficulties in successfully identifying the 'correct'relationships between the variables in data which contain a unit root, as issues of spurious correlation may arise (ARUP, 2010). The ARDL model used in this study is expressed as follows:

$$\Delta ROA_t = \delta + \sum_{i=1}^{n} \delta_{1i} \Delta LnROA_{t-i} + \sum_{j=0}^{n} \delta_{2j} \Delta SR + \sum_{k=o}^{n} \delta_{3k} \Delta INFL_{t-k} + \sum_{l=0}^{n} \delta_{5l} \Delta OMO_{t-l} + w_1 ROA + w_2 SR_{t-1} + w_3 LnINFL_{t-1} + w_5 OMO_{t-1} + \varepsilon_t$$

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Where δ =intercept:w_1 =information about the error correction process: w_1, w_2, w_3, w_4, w_5= long-run parameters: $\delta_{2j}, \delta_{3k}, \delta_{4l}$ =parameters for the short-run effects of the explanatory variables ROA: δ_{1i}=inertial dynamic effects: $\delta_{20}, \delta_{30}, \delta_{40}$ =contemporaneous effect of the respective explanatory variables ROA: Δ and ε_t = first difference operator and the white noise term.

According to Gujarati (2003) when non-stationary time series data is regressed on another non-stationary time series data, the results may suffer from an economic problem called Cointegration and the results are likely to be spurious(nonsensical). Therefore, it is important for the researcher to test for stationarity. The stationarity and non - stationarity of a series can strongly influence its behavior and properties - e.g. persistence of shocks will be infinite for non-stationary series. It is vital to note in time series regression analysis, that relationships among the variables may change over time or a sudden shift in the variables may occur (Hansen, 1992). Given the above-mentioned, this study utilizes the Bai-Peron (1998, 2003) procedures to test for structural breaks as well as selecting the break dates. Once structural break dates have been identified they are included in the ARDL models as dummies to account for the regime shifts in the long-run relationships.

V. RESEARCH RESULTS AND ANALYSIS

Descriptive Statistics

Table 1 below presents statistical summaries of variables under study over the period of interest produced by Eviews version 10 software.

Table 1: Descriptive Statistics for Variables in the research (ROA, SRR, ALR, OMO)

	ROA	STATUTORY_ RESERVES	ALR	OMO
Mean	3.3779133	9.071382	22.4692	4.282713
Median	3.041503	6.779817	23.25379	3.635042
Maximum	5.4706293	17.40171	33.243	12.69283
Minimum	-3.192588	5.799395	14.29571	-2.48E-16
Std. Dev.	1.210977	4.281867	4.491903	4.16438315
Skewness	-0.043731	0.823071	-0.075141	0.76337075
Kurtosis	5.821983	3.15914	2.40777	3.37380945
Jarque-Bera	71.912988	23.69619	0.790478	18.64121235
Probability	0.000000	0.000339	0.577182	0.00606125
Sum	258.41367	2022.629	3774.411	601.359015
Sum Sq. Dev.	268.39297	1782.48	3746.711	1373.221
Observations	132	132	132	132

The descriptive statistics provided evidence of the ways in which the variables had behaved over the course of time (2007-2017) under review. The results presented in the following Table 5.1, indicate that both the dependent variable (Return on Assets) and the major independent variable (Statutory reserve Ratio) follow a normal distribution, with P-values that fall below the 5% critical value.

Stationarity Test

The stationarity of each variable was investigated using the Augmented Dickey Fuller test, also known as ADF.

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Table 2: Stationarity Test Results

Variables	At Level			At First Difference		
	T-statistic	P-Value	Lags	T-statistic	P-Value	Result
ROA	-4.3033.	0.0006*				**I(0)**
S-R	-1.713	0.417	3	-15.537	0.000*	**I(1)**
CPI	1.513	0.979		-6.934	0.000*	**I(1)**
OMO	-2.837	0.0524	2	-17.0549	0.000*	**I(1)**
ALR	-5.68*		1	-6.22	0.000*	**I(1)**

The unit root equations for both ADF contains a constant. The lag selection criteria for ADF test was AIC. *, **, *** . The asterisks refer to 1%, 5% and 10% significance level.

According to the findings, the dependent variable is integrated of order 1, while all the other variables are integrated at the same level of order 1. This indicates that it adheres to a first-order integrated process. This lends credence to the notion that the dependent variable possesses a unit root and that, in its original form, it is not stationary. Therefore, the Auto Regressive Distributed Lagged (ARDL) limits test approach that was introduced by Pesaran et al (2001) is an approach that is both suitable and agreeable for testing for the co-integration of variables that have been integrated at various orders.

Unit Root Testing

A non-stationary variable has a time varying variance or a time varying mean or both, thus, making it difficult to generalize results to different time periods other than the periods under consideration. A balanced panel unit root test was done on all the variables using Eviews version 10 software and Levin – Lin – Chu method of analysis. Accordingly, it was found that all the study variables were stationary at the level and thus integrated of order zero I(0).

ARDL Estimation

Multiple Breakpoint Test

Testing for structural breaks is essential in ensuring the robustness of econometric analysis and the reliability of findings derived from time series data. This method is commonly used to examine possible changes or discontinuities in the data, helping to identify specific points in time where significant alterations in the relationships between variables may have taken place. In this study, the researcher aimed to estimate an Autoregressive Distributed Lag (ARDL) model, a widely used econometric method for analysing the long-term associations between variables. Prior to conducting the estimation, the researcher performed a Sequential Bai Perron Test, a well-established technique used to identify structural breaks.

The findings of the test, as shown in Table 5.1, provide valuable insights into the behaviour of the variables that were studied. The scaled F-statistic is a crucial metric used to determine the presence of a structural break. The scaling of the evaluation is adjusted based on the number of different regressors, resulting in a more accurate assessment. The test used return on assets (ROA) as the dependent variable to measure commercial bank performance. The regressors included important economic factors such as the Statutory Reserve Ratio, Inflation, Average Lending Rates, and Open Market Operation Balances.

To determine the importance of the structural break(s), the researcher utilised a significance level of 5%. This level indicates the threshold at which a break is considered statistically significant. The Sequential Bai-Perron test detected a single breakpoint occurring in October 2009. This revelation is significant as it indicates a distinct change in the dynamics of the variables being analysed. To accommodate this shift, a binary dummy variable was created, taking the value of zero before the identified break and one after. The inclusion of a dummy variable is essential for accurately measuring the effects of structural changes and adjusting the model accordingly. By conducting a thorough analysis, you can assess the impact of the structural break in October 2009 on the relationships between variables. This will lead to a more nuanced and accurate interpretation of the research findings.

Table 3: Break dates

	Sequential	Repartition
1	2009M10	2009M10

The optimal lag length was required to run the ARDL, hence the Unrestricted VAR model was utilised to estimate the optimal lag length. Lag 2 was chosen because it had the lowest AIC value of -12.17 in Table 5.4 (Appendix 1). Once the optimal latency was determined, the model ARDL (2, 0, 0, 2, 0, 0)) was chosen via automatic selection, as shown in Appendix 1, and the dummy variable 1 was found to be negligible but was included because its deletion from the model harmed the

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model's stability. When the ARDL F-statistic is significant, as it is at the 1% level, it indicates that the model employed was properly described. In other words, the model's variables and lag structure are appropriate for examining the relationship between statutory reserve requirements and commercial bank performance in Zambia.

The significance of the ARDL F-statistic also indicates that statistical conclusions from the model can be made with confidence. This suggests that the relationships or associations and effects discovered between changes in statutory reserve requirements and commercial bank performance are statistically significant and not due to random chance in the context of this study. The F-statistic's significance increases confidence in the model's findings. It indicates that the model is capturing important relationships and explaining variations in commercial bank performance based on changes in statutory reserve requirements in Zambia.

ARDL (2, 0, 0, 2, 0, 0) Co-Integration Test

As illustrated in Table 4. The calculated (*F*-statistic) is 10 and is statistically significant at the 1% upper critical bound. This result confirmed the existence of a long-run level relationship between the dependent variable, return on assets, and the set of its covariates.

Table 4: ARDL (2, 0, 0, 2, 0, 0) Co-integration bounds Test

Test Statistic	Value	k
F-statistic	10.00304	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

In the context of the research on the effect of changes in statutory reserve ratio requirements on commercial bank performance in Zambia, it was vital to assess the diagnostic statistics to ensure the reliability and robustness of the econometric model. These diagnostics provide critical insights into the quality of the model and the validity of the findings.

The results, as outlined in Table 5, indicate that the residuals in the model are found to be serially uncorrelated. This is an important result because serial correlation in residuals can indicate that there may be some information or patterns that the model has not captured. The Breusch-Godfrey serial correlation LM test has confirmed the absence of serial correlation in the residuals.

The model's residuals are also found to be homoscedastic, meaning that the variance of the residuals is constant across all levels of the independent variables. Homoscedasticity is an important assumption for regression models because it ensures that the model's predictions are reliable. The ARCH LM test has verified that there are no issues with heteroscedasticity.

The Ramsey RESET test for model misspecification has been conducted and found to be statistically insignificant. This is a positive outcome, indicating that the model is not affected by functional misspecification. In other words, the chosen model adequately represents the underlying relationships between the variables that were being studied.

These diagnostic results collectively strengthen the validity of the econometric analysis. They suggest that the statistical assumptions of the model, including the absence of serial correlation, homoscedasticity, and functional misspecification, have been met. This enhances the reliability of the findings, making them more credible and robust.

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Table 5: ARDL Estimation Diagnostic Test for data problems

TEST	F - STATISTIC	P-VALUE
Serial Correlation: Breusch-Godfrey serial correlation LM test	0.83	0.41
Autoregressive conditional Heteroskedasticity: White test.	0.32	0.73
Ramsey RESET Test: Functional Form	0.06	0.62

In the context of the research, which examined the effect of changes in statutory reserve ratio requirements on profitability of commercial bank performance in Zambia, it's crucial to ensure the stability and reliability of the estimated coefficients in the error correction model (ECM). This adds rigor to the analysis and strengthens the validity of the findings. As per the methodology employed, as explained by Pesaran and Pesaran (1996), one way to assess this stability is by utilizing graphical representations of the CUSUM and CUSUMQ statistics, which are displayed in Figure 1 and Figure 2, respectively.

Figure 5.1 illustrates the CUSUM statistic, and it is indicative of the overall stability of the model. According to the methodology adopted, the null hypothesis suggests that the regression equation is correctly specified if the plot of these statistics remains within the critical bound at the 5% significance level. In this case, Figure 1 shows that the fitted line falls within the critical bound lines, which is a positive outcome. This implies that, at this stage, there is no strong evidence to suggest that the regression equation is incorrectly specified.

However, the situation is somewhat different in Figure 2. This figure presents the CUSUMQ statistic, which is a measure of the stability of the model with respect to the square of the residuals. In this instance, the graph reveals that the model is not as stable as one might hope. The fitted CUSUMQ line extends outside the critical bound, indicating some instability. This instability suggests that the model may not be fully robust, and there could be issues that need to be addressed. The ultimate outcome of this analysis is significant. It confirms that within the ARDL framework, there is a long-run relationship between returns on assets and the covariates included in the research. This finding is fundamental to this study and underscores the importance of the findings obtained. It indicates that the relationship between statutory reserve ratio requirements and commercial bank performance is not just a short-term or sporadic correlation but a long-term and enduring relationship.

Figure 1: CUM TEST

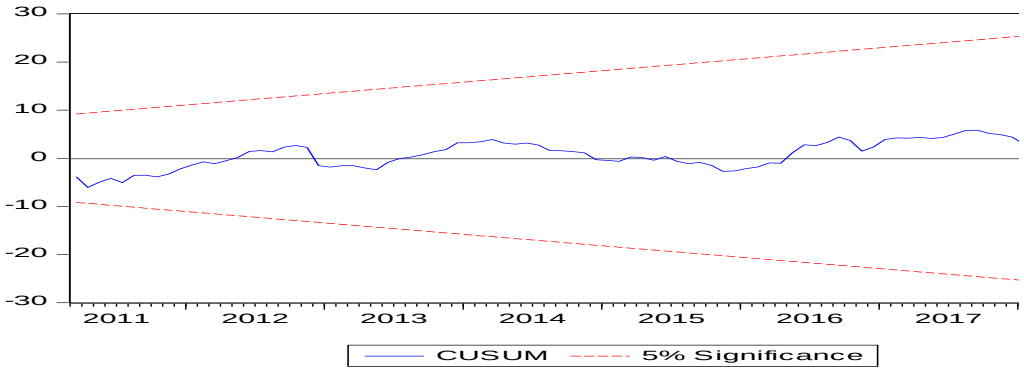
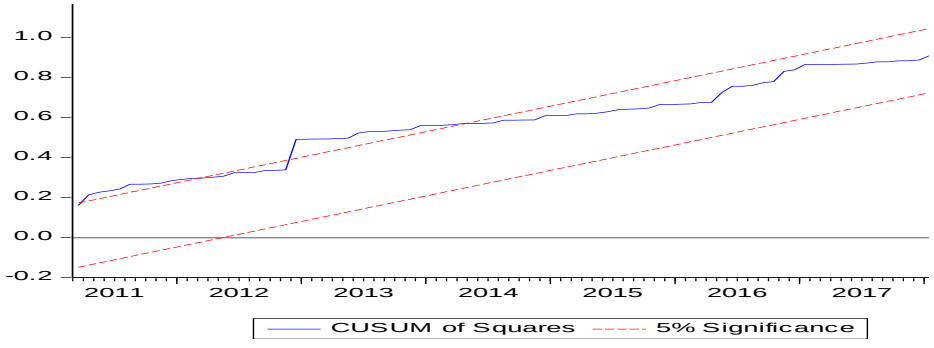


Figure 2: CUSUM OF SQUARE TEST



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The findings pertaining to both the short-run and long-run Autoregressive Distributed Lag (ARDL) models are shown in Table 5.2. These research findings provide valuable insights into the effect of changes in statutory reserve requirements and other external variables on the financial performance of banks during the period under review.

i. Short-Run Results

The short run results are presented below as follows:

a) Error Correction Term (ECT)

The error correction term (ECT) in the co-integration form equation is expected to have a negative sign, reflecting its role in correcting deviations from long-run equilibrium. The coefficient of the ECF shows the speed of adjustment, which is calculated to be 62.48%. This means that bank profitability in Zambia converges monotonically toward its long-run equilibrium path at a rate of 62.48%. A higher speed of adjustment indicates a relatively rapid return to long-term profitability following shocks or deviations.

b) First Lag of ROA

In the short run, the first lag of return on assets (ROA) is statistically significant. This suggests that a one-unit increase in the first lag leads to a reduction in ROA by 0.13 units. In essence, past profitability has a negative impact on current ROA in the short term.

c) Inflation and Average Lending Rates

Inflation and average lending rates are also found to be statistically significant in the short run, both at a 5% level of significance. An increase of one unit in inflation or average lending rates results in reduced ROA, as indicated by their respective coefficients. Therefore, higher inflation and lending rates are associated with lower profitability in the short run.

ii. Long-Run Results

The long run results are presented below as follows:

a) Statutory Reserves

In contrast to the short-run findings, in the long run, statutory reserves were found to be statistically insignificant in affecting bank performance. This implies that changes in statutory reserves do not significantly affect the long-term profitability of commercial banks in Zambia.

b) Open Market Operations (OMO)

Open market operation balances were identified to have a statistically significant negative relationship with return on assets in the long run. An increase of 1% in open market operation balances, on average, results in a reduction of 0.02 in return on assets. This indicates that higher open market operation balances are associated with lower profitability over the long term.

c) Structural Break and Average Lending Rates

Both structural break and average lending rates were found to be statistically insignificant for the period under review. This means that while the first structural break had a negative impact on return on assets, this effect was not statistically significant. Average lending rates also did not have a statistically significant influence on long-term profitability.

Table 6: ARDL (2, 0, 0, 2, 0, 0) Co-integrating and Long Run Form

ARDL Cointegrating And Long Run Form
Dependent Variable: ROA
Selected Model: ARDL (2, 0, 0, 2, 0, 0)
Included observations: 132

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ROA(-1))	-0.132264	0.076117	-1.855869	0.0654
D(STATUTORY_RESERVES)	0.056900	0.041455	1.372583	0.1827
D(CPI)	-0.010699	0.004246	-2.519670	0.0128
D(ALR)	-0.333691	0.143709	-2.321992	0.0215
D(ALR(-1))	-0.214350	0.141000	-1.520210	0.1305
D(OMO)	-0.106985	0.059116	-1.809739	0.0723
D(DM1)	-0.077388	0.452533	-0.171010	0.8644
CointEq(-1)	-0.624802	0.091212	-7.059448	0.0000

Cointeq = ROA - (0.0884*STATUTORY_RESERVES -0.0166*CPI + 0.0067
*ALR -0.1662*OMO -0.1202*DM1 + 4.0191)

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Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
STATUTORY_RESERVES	-0.088367	0.061761	2.387862	0.0172
CPI	-0.016616	0.006230	-2.666963	0.0085
ALR	0.006650	0.044647	0.148953	0.8818
OMO	-0.166150	0.092406	-1.798050	0.0741
DM1	-0.120185	0.703054	-0.170947	0.8645
C	4.019059	1.396535	2.877880	0.0046

VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary of Findings

The study examined the effect of changes in reserve ratio requirements on commercial banks' financial performance, focusing on two main research objectives: assessing the relationship between statutory reserve ratio requirements and bank profitability measured by return on assets (ROA) and evaluating the relationship between other monetary policy tools and bank profitability as measured by ROA.

The evolving dynamics of the Zambian economy, particularly shifts in the policy rate and statutory reserve requirements managed by the Bank of Zambia, have added complexity for banks. Recent developments, especially regarding statutory reserve requirements, have created uncertainty for commercial banks, compounded by considerable exchange rate volatility in Zambia's market and the broader macroeconomic environment. The Bank of Zambia plays a crucial role in responding to these developments, considering macroeconomic variables when formulating and implementing monetary policy to ensure stability and resilience in the banking sector.

The research findings indicate a substantial inverse relationship between statutory reserves and commercial banks' performance, as evidenced by ROA. Specifically, the analysis focused on assessing the effects of changes in statutory reserve ratio requirements on commercial banks' performance in Zambia, with a focus on ROA measurement. The F-statistic serves as a critical statistical measure, validating a significant and ongoing relationship between the dependent variable, ROA, and the covariates used in the analysis. The computed F-statistic, exceeding the upper critical bound at the 1% level, indicates statistical significance, supporting the claim of a significant association.

These findings confirm the initial hypothesis regarding the effect of changes in statutory reserve ratio requirements on commercial bank performance, particularly in terms of ROA, and underscore the long-lasting nature of this influence. The evidence of a cointegrating relationship suggests that variations in reserve requirements have a lasting and significant effect on the financial performance of commercial banks in Zambia.

Conclusions

The study examined how Statutory Reserve Ratio Requirement changes affected Zambian commercial banks' profitability from 2007 to 2017. The research has revealed the complex relationship between statutory reserves and bank profitability, making it crucial for Zambia's banking sector. A statistically significant association existed between statutory reserves and bank performance. According to economic theory principles like the Interest rate pass through theory, an upward adjustment in statutory reserves decreases bank profitability. The allocation of additional cash to statutory reserves reduces banks' available capital for lending and other income-generating operations like lending to retail and corporate clients. In addition to required reserves, the research considered bank-specific profitability considerations. The research showed that inflation and open market operation balances negatively affect banks' profits. An increase in either of these variables, or both, negatively correlated with commercial banks' profitability from 2007 to 2017. This shows that inflation and the central bank's open market operations affect bank finances. The rate of adjustment from short run to long run equilibrium and bank profitability were also examined. According to empirical data, the adjustment process is 62.48% fast. When banks deviate from the long-run equilibrium (where they maximise profits), the system corrects itself at 62.48%. In practice, the Zambian banking system strives for continuous and long-term profitability despite external or internal problems.

The empirical research shows that statutory reserves, inflation, and open market operating balances affect Zambian bank profitability. Bank profitability is inversely correlated with statutory reserves, highlighting the trade-off banks face between regulatory duties and income production. Policymakers, financial institutions, and scholars can use the data to better understand Zambia's banking sector and identify ways to balance regulatory compliance and financial performance.

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Recommendations

Based on the findings obtained in the study, the following recommendations are made:

- Implement a strategic approach to optimise the allocation of funds, balancing regulatory obligations with liquidity requirements for income generation.
- Evaluate statutory reserve levels regularly and establish robust risk management strategies to minimise negative impacts on profitability.
- Prioritise effective risk management practices to mitigate adverse effects, including diversifying income sources and expanding into new financial products or markets.
- Establish a strong asset-liability management framework to sustain favourable liquidity positions, especially during periods of heightened reserve requirements.
- Monitor macroeconomic factors such as inflation and open market operations closely, adapting policies flexibly to dynamic economic conditions.
- Communicate with regulatory authorities, like the Bank of Zambia, to address the effects of statutory reserves and advocate for policies that ensure a harmonious balance between financial stability and profitability.

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