

An Examination of the Macroeconomic Factors that Affect Bank Capital Position in Zambia

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ABSTRACT

The Zambian banking sector has experienced a recurring pattern of institutional failures and regulatory seizures driven by persistent undercapitalization. This has led to growing exposure of the banking sector to macroeconomic instability. The occurrence of bank insolvencies indicates that regulatory adjustments alone have not resolved the underlying vulnerabilities affecting bank capital positions. The study aimed to establish the factors affecting the capital position/solvency ratio in Zambia and to analyse the effect of exchange, interest rates and GDP on capital position over the period 2007 to 2024.

The study adopted a quantitative research approach using secondary time-series data covering the period 2007 to 2024. An AutoRegressive Distributed Lag model and Error Correction Model framework were employed to estimate both short-run and long-run relationships among variables. Descriptive statistics and diagnostic tests were conducted to ensure model validity and reliability.

The findings indicate that the average capital-to-asset ratio was 11.15%, reflecting moderate capital adequacy within the banking sector over the study period. The findings reveal that the model is statistically significant and explains 52% of the variation in bank capital position ($R^2 = 0.5202$). In the long run, lending interest rate has a negative and statistically significant effect on CAR ($\beta = -0.0362$, $p < 0.01$), while GDP growth exerts a positive and significant influence ($\beta = 0.2459$, $p < 0.05$). Exchange rate depreciation negatively affects bank capital ($\beta = -0.1868$, $p < 0.05$). Similarly, unemployment rate shows a negative and significant effect ($\beta = -0.7276$, $p < 0.05$).

The study concludes that macroeconomic conditions play an important role in shaping the resilience of the banking sector in Zambia. Stable exchange rates, moderate interest rates, and sustained economic growth are associated with stronger bank capital positions. Therefore, policymakers should promote macroeconomic stability and banks should strengthen risk management practices to improve capital resilience.

Keywords: *Capital adequacy, Exchange rate, Interest rate, GDP growth, Unemployment, Zambia*

INTRODUCTION

Background

The banking sector functions as a foundational component of economic development by facilitating financial intermediation, mobilizing domestic savings, and allocating capital to productive investments. Through these mechanisms, commercial banks support consumption, enable business expansion, and maintain macroeconomic stability (Mishkin, 2019). A well-capitalized banking system is essential for sustaining financial resilience, particularly in developing economies where external shocks and structural vulnerabilities frequently disrupt economic activity. International regulatory standards, notably the Basel I, II, and III frameworks established by the Basel Committee on Banking Supervision, provide standardized guidelines for defining and monitoring regulatory bank capital. These frameworks recognize capital as a loss absorbing buffer that protects depositors, maintains market confidence, and ensures continuous credit provision during periods of financial stress (Basel Committee on Banking Supervision, 2019). Capital structure decisions directly influence a financial institution

ability to withstand adverse economic conditions while maintaining profitability. An optimal capital position balances the trade-off between regulatory compliance, risk absorption capacity, and return on equity (Margaritis & Psillaki, 2010). Banks that maintain adequate capital buffers are better positioned to extend credit, support private sector growth, and contribute to broader developmental objectives (Alves et al., 2023).

In the African context, and specifically within Zambia, the banking sector remains highly sensitive to fluctuations in macroeconomic indicators. Currency volatility, elevated lending rates, and variable economic growth patterns consistently affect bank balance sheets, credit quality, and overall solvency. Historical evidence demonstrates that periods of macroeconomic instability in Zambia have repeatedly triggered capital erosion, regulatory interventions, and institutional failures. Between May 1995 and December 1998, the Bank of Zambia oversaw the closure of several financial institutions, including African Commercial Bank, Credit Africa Bank, Manifold Investment Bank, and Meridien Bank Zambia Limited, while Prudence Bank was placed under liquidation (Kabemba & Kabwe, 2024). This period of instability highlights the vulnerabilities within the Zambian banking system and the necessity of maintaining adequate capital levels to withstand economic shocks. Recent developments in global financial markets and the transmission of international monetary policies have further intensified the exposure of Zambian banks to external economic pressures (Hassan & Aouina, 2021; Ndiokubwayo et al., 2022). The integration of domestic financial institutions into global capital markets requires robust risk management frameworks and sustained capital adequacy. However, empirical observations indicate that many commercial banks in Zambia operate with thin capital margins, making them vulnerable to sudden shifts in interest rates, exchange rate depreciation, and declining economic output. The absence of comprehensive empirical analysis linking macroeconomic dynamics to bank capital positions limits the effectiveness of regulatory interventions and strategic bank management practices.

The theoretical foundation for examining these dynamics draws from established financial and economic models. The Capital Buffer Theory posits that banks maintain capital reserves above regulatory minimums to hedge against unexpected economic shocks and adjust their holdings in response to macroeconomic uncertainty (Jokipii & Milne, 2008). The Financial Accelerator Theory explains how minor macroeconomic fluctuations are amplified through the banking system, as deteriorating collateral values and tightening credit conditions reduce lending capacity and erode capital ratios (Bernanke, Gertler & Gilchrist, 1999). The Trade Off Theory further clarifies how institutions balance the benefits of holding additional capital against the opportunity costs of reduced profitability (Kraus & Litzenberger, 1973). Finally, the Macroeconomic Stability Hypothesis asserts that predictable interest rates, controlled inflation, and stable exchange rates create an environment where banks can accumulate capital through retained earnings rather than emergency recapitalization (Mishkin, 2016). These theoretical perspectives collectively justify the investigation of external economic variables as primary drivers of banking sector solvency.

Statement of the problem

The Zambian banking sector has experienced a recurring pattern of institutional failures and regulatory seizures driven by persistent undercapitalization. Notable examples include the insolvency and takeover of Investrust Plc in April 2024, the seizure of Development Bank of Zambia in July 2023, and the closure of Intermarket Bank, Commercial Leasing Zambia, CETZAM Financial Services, Genesis Finance, and Better Now Finance across recent years. These failures occurred despite regulatory efforts to strengthen capital requirements, including the substantial increase in minimum capital thresholds from K12 million to K104 million for domestic banks and K520 million for foreign institutions (Bank of Zambia, 2012). The continued occurrence of bank insolvencies indicates that regulatory adjustments alone have not resolved the underlying vulnerabilities affecting bank capital positions.

A significant gap exists in the current academic and policy literature regarding the relationship between macroeconomic indicators and bank capital adequacy in Zambia. Previous studies have predominantly examined internal bank determinants such as profitability metrics, credit supply dynamics, liquidity management, and corporate governance structures (Momba, 2021; Mulenga, 2020; Chisomo & Kayombo, 2023). While these internal factors remain relevant, they do not fully capture the external economic pressures that systematically influence capital accumulation and erosion. Macroeconomic variables, including exchange rate fluctuations,

lending interest rate movements, gross domestic product growth, and unemployment trends, directly affect loan repayment capacity, asset valuation, foreign currency exposure, and overall bank profitability. Regional evidence suggests that increased capital requirements without corresponding macroeconomic stability can paradoxically increase financial instability in African banking systems (Bawuah, 2024). The failure to empirically model these relationships leaves policymakers and bank managers without evidence-based guidance for capital planning and risk mitigation. If the relationship between macroeconomic conditions and bank capital positions remains unaddressed, the financial sector will continue to face systemic risks. Repeated bank failures result in job losses, depositor inconvenience, frozen accounts, and shareholder value destruction. These outcomes undermine public confidence in the financial system and constrain credit availability for productive sectors of the economy. This study addresses the empirical gap by investigating how selected macroeconomic factors influence the capital to asset ratio of commercial banks in Zambia. The findings will provide actionable insights for regulatory authorities, financial institutions, and academic researchers seeking to enhance financial stability and promote sustainable banking sector development.

Research Objectives

- I. To establish the factors affecting the capital position/solvency ratio in Zambia
- II. To analyze the effect of exchange, interest rates and GDP on capital position
- III. To formulate measures that can improve the capital position of commercial banks in Zambia

METHODOLOGY

Research design

This study adopted a quantitative research design, employing a correlational and explanatory approach to examine the relationship between macroeconomic variables and bank capital position in Zambia. The choice of this design was informed by its suitability in analysing numerical data and establishing statistical relationships between variables. Quantitative designs are widely used in macro-financial research as they allow for objective measurement, hypothesis testing, and generalisation of findings (Saunders et al., 2019).

The study is grounded in a positivist research philosophy, which assumes that reality can be measured objectively through observable data and statistical analysis (Creswell & Creswell, 2018). A deductive approach was adopted, whereby hypotheses derived from established theories were tested using empirical data. This approach enables the validation of theoretical relationships between macroeconomic variables and bank capital position within the Zambian context.

Data collection methods

The study relied on secondary data obtained from credible and authoritative sources to ensure accuracy and reliability. Data on bank capital position, measured using the capital to asset ratio, were sourced from the Bank of Zambia. Macroeconomic variables including exchange rate, interest rate, gross domestic product growth, and unemployment rate were obtained from international and national databases such as the World Bank, International Monetary Fund, and Zambia Statistics Agency.

The study utilised time series data covering the period 2007 to 2024. This period was selected to capture significant macroeconomic fluctuations, policy changes, and structural developments within Zambia's financial sector. The use of secondary data is appropriate in macroeconomic studies, as it provides consistent and comparable datasets across time and enhances the validity of the analysis.

Target population and sampling procedures

The target population of the study comprised all commercial banks operating in Zambia and regulated by the Bank of Zambia. Given the use of aggregated national level data, the study adopted a census approach rather

than a sample. This approach ensures that the analysis reflects the overall performance and capital position of the entire banking sector.

A purposive sampling technique was applied in selecting variables relevant to the study. The selected macroeconomic variables, namely exchange rate, interest rate, gross domestic product growth, and unemployment rate, were chosen based on their theoretical and empirical relevance to bank capital determination.

Data analysis techniques

Data analysis was conducted using statistical software, specifically Stata and SPSS. The analysis followed a structured process involving several econometric techniques.

Descriptive statistics were first used to summarise the characteristics of the data, including mean, standard deviation, and range, providing an overview of trends in both macroeconomic variables and bank capital position. Correlation analysis was then performed to assess the direction and strength of relationships among variables.

To ensure the validity of time series analysis, unit root tests using the Augmented Dickey Fuller method were conducted to determine the stationarity of the variables. This step is essential in avoiding spurious regression results and ensuring reliable estimation.

The study employed multiple linear regression analysis to examine the effect of macroeconomic variables on bank capital position. The econometric model is specified as follows:

$$CAR_t = \beta_0 + \beta_1 EXR_t + \beta_2 INR_t + \beta_3 GDP_t + \beta_4 UER_t + \varepsilon_t$$

Where CAR represents the capital to asset ratio, EXR is the exchange rate, INR is the interest rate, GDP is the gross domestic product growth rate, and UER is the unemployment rate.

Diagnostic tests were also conducted to assess the robustness of the model, including tests for multicollinearity, heteroscedasticity, autocorrelation, and normality. These tests ensure that the model satisfies the assumptions of regression analysis and that the results are reliable.

Validity, reliability and ethical considerations

Reliability was ensured through the use of data from reputable sources such as the Bank of Zambia, World Bank, and International Monetary Fund. These institutions provide verified and widely accepted macroeconomic and financial data.

Validity was achieved through appropriate model specification, use of relevant variables, and application of diagnostic tests to confirm the accuracy of the results. Statistical significance levels were used to determine the strength of relationships between variables.

Ethical considerations were observed throughout the study. The research relied solely on secondary data, and all sources were properly acknowledged. The study ensured transparency, accuracy, and integrity in data analysis and reporting.

RESULTS AND DISCUSSION

Results

This section presents the empirical findings on the relationship between macroeconomic variables and bank capital position in Zambia. The analysis includes descriptive statistics, unit root tests, regression results, and diagnostic tests.

Descriptive Statistics

The descriptive statistics summarise the key characteristics of the variables over the study period.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
CAR	18	11.15	2.94	3.50	17.48
LIR	18	13.58	4.48	8.74	22.06
GDPTH	18	5.12	3.04	-2.79	10.30
EXR	18	10.70	6.85	3.75	26.17

The results show that the average capital-to-asset ratio (CAR) is 11.15 percent, indicating that banks in Zambia generally maintained capital levels above minimum regulatory thresholds. However, the minimum value of 3.50 percent reveals periods of undercapitalisation, suggesting vulnerability within the banking sector. The relatively high standard deviation indicates variability in capital positions over time.

Interest rates exhibit considerable volatility, with a mean of 13.58 percent and a wide range, reflecting changing monetary policy conditions. GDP growth averages 5.12 percent but shows fluctuations, including periods of economic contraction. The exchange rate demonstrates significant variability, highlighting exposure to external shocks and currency instability.

Unit root test results

The Augmented Dickey Fuller test was used to examine stationarity.

Table 2: ADF Test at Level

Variable	t-stat	p-value	CONCLUSION
CAR	-3.888	0.0021	Stationary
LIR	-1.486	0.5406	Non-stationary
GDPTH	-2.360	0.1533	Non-stationary
EXR	1.257	0.9964	Non-stationary

Table 3: ADF Test at First Difference

Variable	t-stat	p-value	CONCLUSION
CAR	-6.049	0.0000	Stationary
LIR	-2.358	0.0154	Stationary

GDPH	-5.645	0.0000	Stationary
EXR	-2.662	0.0408	Stationary

The results indicate a mixed order of integration, with variables becoming stationary after first differencing. This confirms the suitability of regression analysis and ensures that the results are not spurious.

Regression results

Table 4: Model Summary

Statistic	Value
R-squared	0.5202
Adjusted R ²	0.4198
Prob > F	0.0483
RMSE	2.9707

The model explains approximately 52 percent of the variation in bank capital position, indicating moderate explanatory power. The model is statistically significant, confirming that macroeconomic variables jointly influence bank capital.

The regression results in table 5 indicate that macroeconomic variables have a statistically significant influence on the capital to asset ratio (CAR) of banks. The lending interest rate (LIR) exhibits a negative and statistically significant relationship with CAR ($\beta = -0.0362$, $p = 0.001$), implying that increases in interest rates are associated with a decline in banks' capital positions, possibly due to higher credit risk and reduced loan demand that adversely affect capital buffers. GDP growth (GDPH) shows a positive and statistically significant effect on CAR ($\beta = 0.2459$, $p = 0.047$), suggesting that improved economic performance enhances banks' capital positions through increased profitability and lower default risk. The exchange rate (EXR) is negatively and significantly related to CAR ($\beta = -0.1868$, $p = 0.018$), indicating that currency depreciation may weaken bank capital positions by increasing foreign currency liabilities and exposure to exchange rate risk. Similarly, the unemployment rate (UER) has a negative and statistically significant impact on CAR ($\beta = -0.7276$, $p = 0.021$), reflecting the adverse effects of rising unemployment on loan repayment capacity and asset quality, which in turn erode bank capital. The constant term is positive and significant ($\beta = 17.63$, $p = 0.001$), representing the average level of CAR when all explanatory variables are held constant. Overall, the findings suggest that macroeconomic stability plays a crucial role in strengthening bank capital positions, while adverse economic conditions undermine capital adequacy.

Table 5: Long Run Estimates

Variable	Coefficient	p-value	Interpretation
LIR	-0.0362	0.001	Negative significant
GDPH	0.2459	0.047	Positive significant
EXR	-0.1868	0.018	Negative significant
Constant	17.63	0.001	Significant

The results show that interest rate, exchange rate, and GDP growth significantly influence bank capital position.

- Interest rate has a negative effect on CAR, indicating that higher borrowing costs weaken capital.
- GDP growth has a positive effect, suggesting that economic expansion strengthens bank capital.
- Exchange rate depreciation negatively affects capital, reflecting increased financial risk.

Table 6: Correlation Results

Variable	CAR	LIR	GDPH	EXR
CAR	1.000	-0.128	0.017	-0.177
LIR	-0.128	1.000	0.633	-0.588
GDPH	0.017	0.633	1.000	-0.497
EXR	-0.177	-0.588	-0.497	1.000

The results show weak correlations between CAR and macroeconomic variables, suggesting that capital adequacy is influenced by broader structural and regulatory factors beyond short term macroeconomic changes.

Diagnostic tests

The model satisfies key econometric assumptions:

- No omitted variables (RESET test $p = 0.8036$)
- No autocorrelation ($p = 0.7195$)
- No heteroscedasticity ($p = 0.7689$)
- No multicollinearity (mean VIF = 2.27)
- Residuals are normally distributed

These results confirm that the model is statistically reliable and suitable for inference.

Figure 1: Stability test results

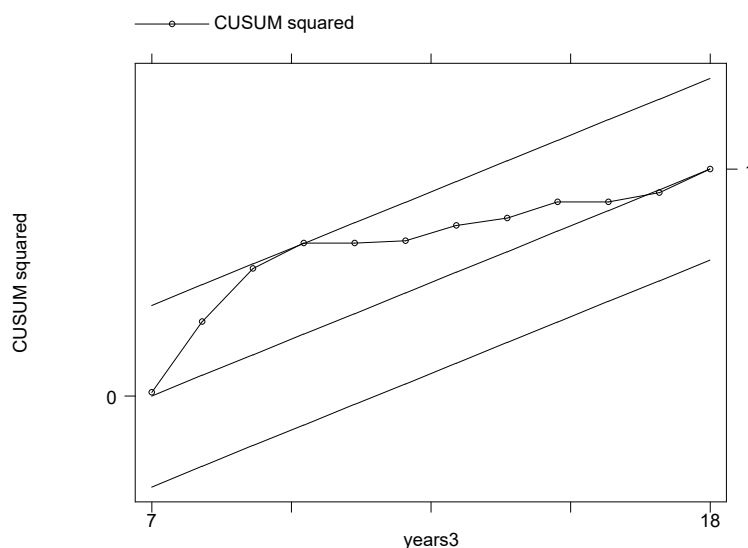


Figure 1: Stability test results

Discussion

The findings show that macroeconomic variables play a significant role in determining bank capital position in Zambia.

The negative relationship between exchange rate and bank capital suggests that currency depreciation weakens banks' financial positions. This is largely due to increased foreign currency liabilities and higher credit risk among borrowers with foreign denominated loans. This finding is consistent with evidence from developing economies, where exchange rate volatility exposes banks to financial instability (Tembo, 2024).

Interest rates also exhibit a negative effect on bank capital. Higher interest rates increase the cost of borrowing, leading to higher default rates and reduced profitability. This weakens banks' capital buffers. The result supports findings from studies in Nigeria and other emerging markets, which show that tight monetary conditions reduce bank stability (Aremu et al., 2020).

GDP growth shows a positive and significant relationship with bank capital. This indicates that economic expansion improves loan performance, reduces default risk, and enhances profitability, allowing banks to strengthen their capital positions. This aligns with procyclical theory, which suggests that banks accumulate capital during economic upturns (Momba, 2021).

The overall findings confirm that macroeconomic stability is essential for maintaining a strong banking sector. Exchange rate volatility and high interest rates weaken capital positions, while economic growth strengthens them. These results highlight the importance of coordinated monetary and fiscal policies in promoting financial stability (Efremenko, et al., 2017).

Furthermore, the relatively weak correlation between CAR and macroeconomic variables suggests that regulatory frameworks and internal bank strategies also play an important role in determining capital adequacy. This indicates that macroeconomic factors alone do not fully explain bank capital dynamics, and institutional factors must also be considered.

Overall, the study provides evidence that improving macroeconomic stability is key to strengthening bank capital position and enhancing the resilience of the banking sector in Zambia.

CONCLUSION

Conclusion

This study examined the effect of selected macroeconomic variables on the capital position of commercial banks in Zambia, using the capital to asset ratio as a measure of bank solvency. The analysis focused on exchange rate, interest rate, and gross domestic product growth over the study period. The findings provide empirical evidence that macroeconomic conditions significantly influence bank capital position in Zambia.

The results show that exchange rate depreciation has a negative effect on bank capital, reflecting the exposure of banks to foreign currency risk and the adverse impact of currency fluctuations on balance sheets. Similarly, interest rates were found to negatively affect bank capital, suggesting that high borrowing costs increase loan defaults and reduce profitability, thereby weakening capital buffers. In contrast, GDP growth was found to have a positive effect on bank capital, indicating that improved economic performance enhances asset quality, profitability, and capital accumulation.

The diagnostic tests confirmed that the estimated model is statistically reliable, with no evidence of autocorrelation, heteroscedasticity, or model misspecification. The findings therefore provide a sound basis for drawing conclusions on the relationship between macroeconomic variables and bank capital position in Zambia.

Overall, the study concludes that macroeconomic stability plays a central role in strengthening the resilience of the banking sector. Adverse macroeconomic conditions such as currency depreciation and high interest rates

weaken bank capital, while economic growth supports capital adequacy. These results highlight the importance of maintaining a stable macroeconomic environment to promote financial sector stability and sustainable economic development in Zambia.

Recommendations

Based on the findings of the study, the following recommendations are proposed:

Monetary authorities should promote exchange rate stability through prudent macroeconomic policies and effective foreign exchange management. Reducing excessive exchange rate volatility will help minimise foreign currency risk and protect bank capital positions.

The Bank of Zambia should maintain interest rates at levels that balance inflation control with financial sector stability. Excessively high interest rates increase credit risk and weaken bank capital. Therefore, a more accommodative and stable interest rate environment is necessary to support bank performance.

The Zambian government should implement policies that promote sustained economic growth, including investment in productive sectors, infrastructure development, and support for private sector expansion. Strong economic growth improves borrower capacity, reduces non performing loans, and enhances bank profitability and capital accumulation.

Commercial banks in Zambia should strengthen their risk management frameworks, particularly in managing foreign exchange exposure and credit risk. This includes improving loan appraisal systems, diversifying portfolios, and adopting effective hedging strategies to reduce vulnerability to macroeconomic shocks.

Regulatory authorities should continue strengthening capital adequacy frameworks and ensure strict compliance with prudential regulations. Regular monitoring and stress testing should be conducted to assess the resilience of banks under different macroeconomic scenarios.

Future studies should incorporate additional variables such as inflation, fiscal policy indicators, and bank specific factors to provide a more comprehensive analysis of determinants of bank capital. Further research could also adopt panel data approaches using individual bank level data to capture heterogeneity across banks.

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Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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