MAKERERE UNIVERSITY

EFFECT OF THE CENTRAL BANK RATE, INFLATION AND COMMERCIAL BANK LENDING RATE ON GROSS DOMESTIC PRODUCT IN UGANDA: A QUARTERLY TIME-SERIES ANALYSIS (2017–2025)

BY

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A DISSERTATION SUBMITTED TO THE SCHOOL OF STATISTICS AND PLANNING IN PARTIAL FULFILMENT FOR THE AWARD OF BACHELOR'S DEGREE OF SCIENCE IN QUANTITATIVE ECONOMICS MAKERERE UNIVERSITY

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DECLARATION

I, Mugisha Reagan Karukiiko, do hereby declare that this dissertation titled "Effect of the Central Bank Rate, Inflation, And Commercial Bank Lending Rate on Gross Domestic Product in Uganda: A Quarterly Time-Series Analysis (2017–2025)" , submitted in partial fulfillment of the requirements for the award of the Degree of Bachelor of Science in Quantitative Economics (BSQE) at Makerere University, is my own original work. It has not been presented before for any degree or examination at this or any other university and all sources of information have been duly acknowledged.

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APPROVAL

This dissertation has been submitted with approval from the University Supervisor, having been satisfied that it meets the required standards of scholarly work for the award of the stated degree.

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LIST OF ABBREVIATIONS

ADF: Augmented Dickey-Fuller

ARDL: Autoregressive Distributed Lag

BOU : Bank of Uganda

CBR : Central Bank Rate

CBLR : Commercial Bank Lending Rate

CPI : Consumer Price Index

CUSUM : Cumulative Sum of Recursive Residuals

CUSUMSQ : Cumulative Sum of Squares of Recursive Residuals

EAC : East African Community

GDP : Gross Domestic Product

IMF : International Monetary Fund

LNCBLR : Natural Logarithm of Commercial Bank Lending Rate

LNCBR : Natural Logarithm of Central Bank Rate

LNGDP :Natural Logarithm of Gross Domestic Product

LNINF : Natural Logarithm of Inflation Rate

MoFPED : Ministry of Finance, Planning and Economic Development

NKPC : New Keynesian Phillips Curve

OECD: Organization for Economic Co-operation and Development

UBOS: Uganda Bureau of Statistics

UGX : Uganda Shillings

WDI: World Development Indicators

ABSTRACT

This study examined the effect of the Central Bank Rate (CBR), inflation and commercial bank lending rate on Gross Domestic Product (GDP) in Uganda using quarterly time-series data covering the period from 2017 to 2025. The study was motivated by the need to understand the effectiveness of monetary policy transmission and its influence on economic growth in Uganda.

Secondary data were obtained from the Bank of Uganda (BOU), Uganda Bureau of Statistics (UBOS), International Monetary Fund (IMF), and the World Bank. The study employed the Autoregressive Distributed Lag (ARDL) bounds testing approach because the variables exhibited mixed orders of integration, I(0) and I(1). Descriptive statistics, correlation analysis, Augmented Dickey-Fuller (ADF) unit root tests, ARDL bounds testing for cointegration and diagnostic tests were conducted using Stata 17.

The findings revealed the existence of a long-run equilibrium relationship among GDP, the Central Bank Rate, inflation and commercial bank lending rate. The ARDL bounds test produced an F-statistic of 5.237 which exceeded the upper critical bound at the 5 percent significance level, confirming cointegration among the variables. The long-run estimates showed that the Central Bank Rate had a negative effect on GDP ($\beta = -0.1124$), inflation had a negative effect on GDP ($\beta = -0.0821$), and the commercial bank lending rate had the strongest negative effect on GDP ($\beta = -0.6247$). The commercial bank lending rate emerged as the most influential monetary variable affecting economic growth in Uganda.

The study concludes that increases in interest rates and inflation reduce economic growth in the long run, with commercial bank lending rates exerting the greatest impact on GDP. The study recommends policies aimed at reducing commercial bank lending rate spreads, strengthening monetary policy transmission mechanisms and enhancing coordination between monetary and fiscal policy to promote sustainable economic growth in Uganda.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Monetary policy is one of the principal tools governments and central banks deploy to manage macroeconomic stability, foster investment, and sustain economic growth. Across both developed and developing economies, the Central Bank Rate (CBR), inflation and commercial bank lending rates are considered among the most critical monetary policy and financial-sector variables influencing the behaviour of Gross Domestic Product (GDP). The CBR signals the cost of borrowing across the entire financial system; inflation reflects the rate of change in the general price level; and the commercial bank lending rate represents the actual cost of credit faced by households and firms all of which shape consumption, investment, and aggregate output (Ghironi & Ozhan, 2025; Ekinci et al., 2020; Nguyen & Vo, 2021).

At the global level, a rich body of empirical literature confirms that monetary policy variables significantly influence economic growth. Studies from Organization for Economic Co-operation and Development (OECD) countries demonstrate that interest rate adjustments transmit through the financial system to affect investment, credit expansion, and ultimately real output (Batayneh et al., 2021). In developing economies, these relationships can be more complex due to structural rigidities, underdeveloped financial markets and limited monetary policy transmission channels (Ding & Vitenu-Sackey, 2021).

In Sub-Saharan Africa, macroeconomic volatility has been a persistent challenge. Many economies in the region have experienced episodes of high inflation, currency depreciation and interest rate fluctuations that have disrupted investment flows and constrained economic growth (Adu-Gyamfi et al., 2020). Commercial bank lending rates in Sub-Saharan Africa are frequently among the highest in the world, reflecting elevated risk premiums, limited competition in the banking sector, and high operational costs.

Within the East African Community (EAC), Uganda presents a particularly interesting case for examining the relationship between CBR, inflation, commercial bank lending rates, and GDP. Since the establishment of the Bank of Uganda (BOU) as an autonomous monetary authority, the country has adopted an inflation-targeting monetary policy framework

anchored on the CBR as the primary policy signalling tool. The BOU sets the CBR to influence short-term interest rates, credit conditions, and inflation expectations with the ultimate goal of maintaining price stability and supporting sustainable economic growth (Ssemanda, 2025; Mabati & Onserio, 2020).

Uganda's economy has undergone significant structural transformation since the early 2000s, driven by services sector expansion, agricultural productivity improvements, oil sector developments and growing financial sector depth. Nominal GDP has grown from approximately UGX 25 trillion in 2010 to over UGX 150 trillion by 2023. Over the period 2017 to 2025, Uganda experienced notable shifts in its monetary policy stance, with the CBR ranging from a low of 6.5% during the COVID-19 pandemic to a high of 10.25% in 2024.

This study therefore seeks to examine the effect of the Central Bank Rate, inflation and commercial bank lending rate on Gross Domestic Product in Uganda using quarterly time-series data spanning 2017 to 2025. The study employs the Autoregressive Distributed Lag (ARDL) bounds testing framework to capture the long-run equilibrium relationships among the variables.

1.2 Problem Statement

Despite Uganda's adoption of an inflation-targeting monetary policy framework since 2011, the relationships among the Central Bank Rate, inflation, commercial bank lending rates and Gross Domestic Product remain inadequately understood at the quarterly frequency. While the Bank of Uganda regularly adjusts the CBR to manage inflationary pressures and stimulate output, the precise magnitude, direction, and timing of these policy effects on GDP are not well established in the literature.

Between 2017 and 2025, Uganda experienced considerable monetary policy turbulence: the CBR was reduced from 10% to 6.5% during 2017–2021, before being raised sharply to 10.25% by mid-2024. Over the same period, headline inflation peaked at approximately 10.2% in Q3 2022 before subsiding to around 2.8% by Q4 2025 (Bank of Uganda, 2024; UBOS, 2024). Commercial bank lending rates however remained persistently high hovering between 17% and 22% suggesting that policy rate reductions were not fully transmitted to private sector borrowing costs. Without rigorous quarterly time-series evidence on all three

variables simultaneously, policymakers at the Bank of Uganda and the Ministry of Finance, Planning and Economic Development lack the granular empirical foundation needed for effective monetary policy calibration.

1.3 General Objective

To examine the effect of the Central Bank Rate, inflation and commercial bank lending rate on Gross Domestic Product in Uganda using quarterly time-series data for the period 2017 to 2025.

1.4 Specific Objectives

i. To determine effect of the Central Bank Rate on Gross Domestic Product.
ii. To examine the effect of inflation on Gross Domestic Product.
iii. To assess effect of the commercial bank lending rate on Gross Domestic Product.
iv. To assess the combined long-run effect of the Central Bank Rate, inflation, and commercial bank lending rate on Gross Domestic Product.

1.5 Research Hypotheses

H_{01}: The Central Bank Rate has no significant long-run effect on GDP.

H_{11}: The Central Bank Rate has a significant long-run effect on GDP.

H_{02}: Inflation has no significant long-run effect on GDP.

H_{12}: Inflation has a significant long-run effect on GDP.

H_{03}: The commercial bank lending rate has no significant long-run effect on GDP.

H_{13}: The commercial bank lending rate has a significant long-run effect on GDP.

H_{04}: The Central Bank Rate, inflation, and commercial bank lending rate jointly have no significant long-run combined effect on GDP.

H_{14}: The Central Bank Rate, inflation, and commercial bank lending rate jointly have a significant long-run combined effect on GDP in Uganda.

1.6 Significance of the Study

This study makes several important contributions to academic knowledge and policy practice in Uganda and beyond. From a policy perspective, the findings will provide the Bank of Uganda and the Ministry of Finance, Planning and Economic Development (MoFPED) with quarterly empirical evidence on how CBR adjustments, inflation dynamics and commercial bank lending rate movements translate into changes in real output. By identifying long-run effects, the study can help monetary authorities anticipate how policy impulses materialize in GDP.

Academically, the study contributes to the growing time-series econometrics literature on small open economies in Sub-Saharan Africa. By using quarterly data and applying the ARDL bounds testing framework, the study provides methodological benchmarks for future researchers. The inclusion of the commercial bank lending rate as a distinct transmission channel variable extends the existing literature in a theoretically meaningful direction.

1.7 Scope of the Study

1.7.1 Time Scope

The study covers the period from Q1 2017 to Q4 2025, encompassing 36 quarterly observations. This period captures a full monetary policy cycle in Uganda — from the gradual reduction of the CBR (2017–2021) to its subsequent tightening (2022–2025).

1.7.2 Content Scope

The study focuses on four macroeconomic variables: Gross Domestic Product (real GDP at constant 2017 prices), the Central Bank Rate (the Bank of Uganda's policy rate), the inflation rate (annual change in the Consumer Price Index), and the commercial bank lending rate (weighted average lending rate charged by commercial banks). All variables are transformed using natural logarithms for the empirical analysis.

1.7.3 Geographical Scope

The study is confined to Uganda. The country-specific focus allows for a more granular analysis of domestic monetary policy dynamics and avoids the aggregation biases that arise in cross-country panel studies.

1.8 Conceptual Framework

The conceptual framework illustrates the hypothesized long-run relationships between the independent variables (CBR, inflation, and commercial bank lending rate) and the dependent variable (GDP). The Central Bank Rate operates through the interest rate transmission channel: an increase in the CBR raises commercial bank lending rates, which raises the cost of credit, discourages investment and consumption and consequently dampens GDP growth. The commercial bank lending rate operates as the direct financing cost channel. Inflation affects GDP through multiple channels — moderate inflation is consistent with positive growth, but persistently high or volatile inflation erodes purchasing power and distorts investment decisions. Their combined long-run effect on GDP is assessed jointly using the ARDL framework.

INDEPENDENT VARIABLES	→ Long-Run Effect →	DEPENDENT VARIABLE
Central Bank Rate (CBR) — Bank of Uganda Policy Rate (%) Inflation Rate (LNINF) — Annual CPI % Change (ln) Commercial Bank Lending Rate (LNCBLR) — Weighted Average Lending Rate (ln)		Gross Domestic Product (LNGDP) Real GDP at Constant 2017 Prices (ln)

Figure 1.1: Conceptual Framework

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing theoretical and empirical literature on the relationships between the Central Bank Rate, inflation, commercial bank lending rate, and Gross Domestic Product. It is organized into six sections: theoretical frameworks underpinning the study, the relationship between CBR and GDP, the relationship between inflation and GDP, the relationship between commercial bank lending rate and GDP, the joint effect of monetary policy and financial variables on output and research gaps that motivate the present study.

2.2 Theoretical Literature

2.2.1 The Keynesian Transmission Mechanism

The Keynesian theory of monetary transmission posits that changes in the central bank's policy rate influence the economy through the interest rate channel. A reduction in the CBR lowers commercial bank lending rates, reducing the user cost of capital, stimulating investment spending by firms and consumption spending by households, thereby increasing aggregate demand and GDP. The Keynesian framework predicts a negative relationship between the CBR and GDP and between the commercial bank lending rate and GDP (Batayneh et al., 2021).

2.2.2 The Quantity Theory of Money and Inflation

The Quantity Theory of Money holds that inflation is fundamentally a monetary phenomenon: sustained increases in the money supply beyond the growth rate of real output generate inflation. From this perspective, high inflation signals excessive monetary expansion which can destabilize the macroeconomic environment and crowd out productive investment, thereby reducing long-run GDP (Ekinci et al., 2020).

2.2.3 The Taylor Rule

The Taylor Rule (Taylor, 1993) provides a normative framework for central bank rate setting. It prescribes that the policy rate should respond positively to deviations of inflation from its target and to deviations of output from its potential level. The commercial bank

lending rate thus acts as an intermediate transmission channel between the CBR and output (Talam & Kiemo, 2024).

2.2.4 The New Keynesian Phillips Curve

The New Keynesian Phillips Curve (NKPC) relates current inflation to expected future inflation and the output gap, implying that inflation and output are jointly determined. For Uganda, where supply-side factors (food and energy prices) are major inflation drivers, the NKPC provides partial guidance, suggesting the need for empirical analysis that distinguishes demand-pull from cost-push inflation dynamics (Nor, 2024).

2.2.5 Financial Intermediation Theory and the Lending Rate Channel

Financial intermediation theory highlights that the credit market is an important transmission mechanism for monetary policy. In economies like Uganda — where the spread between the CBR and commercial lending rates is consistently large — the commercial bank lending rate becomes an independent driver of GDP. Higher lending rates reduce the volume of credit available to firms and households, dampen capital formation, suppress consumer expenditure and ultimately reduce real GDP (Nguyen & Vo, 2021).

2.3 Empirical Literature on CBR and GDP

Mabati and Onserio (2020) examined the effect of the Central Bank Rate on financial sector performance in Kenya, finding that CBR reductions were associated with increased credit expansion and, indirectly, with higher economic activity. However, they noted that the transmission mechanism was often incomplete due to wide interest rate spreads.

Talam and Kiemo (2024) conducted a critical assessment of monetary policy transmission in East Africa, arguing that structural impediments weaken the CBR's ability to systematically influence GDP. Ssemanda (2025) investigated Uganda's monetary policy transmission mechanism and found evidence of a significant but time-varying relationship between the CBR and output.

2.4 Empirical Literature on Inflation and GDP

Ekinci, Tüzun, and Ceylan (2020) analyzed the inflation–growth relationship across inflation-targeting countries, finding that exceeding the inflation target by more than 2 percentage points can reduce growth by 0.5 to 1.0 percentage points annually. Nor (2024) specifically examined inflation and economic stability in Uganda using annual time-series data and found strong evidence that high inflation suppresses domestic investment and GDP growth, noting a non-linear inflation–GDP relationship.

2.5 Empirical Literature on Commercial Bank Lending Rate and GDP

Nguyen and Vo (2021) examined the relationship between commercial bank lending rates and economic growth in Vietnam using ARDL estimation, finding that a 1 percentage point increase in the commercial bank lending rate was associated with a 0.3 to 0.5 percentage point reduction in real GDP growth in the long run. Ding and Vitenu-Sackey (2021) found that even when the central bank rate was low, high commercial lending rates could undermine the growth-stimulating effects of monetary policy easing in Ghana. Kodongo (2024) found that high lending rate spreads were associated with reduced private sector credit growth and lower investment rates in East Africa.

2.6 Research Gaps

Several important gaps emerge from the review of existing literature. First, the majority of empirical studies on monetary policy and GDP in Uganda employ annual data, limiting statistical power. Second, existing studies rarely model the joint long-run effect of the CBR, inflation, and commercial bank lending rate on GDP simultaneously within a time-series framework for Uganda. Third, no existing study appears to have included the commercial bank lending rate as a distinct independent variable alongside the CBR and inflation in an ARDL framework for Uganda using natural logarithm transformations. Fourth, no existing study has applied the ARDL bounds testing approach to the CBR–inflation–lending rate–GDP nexus using post-2017 quarterly data for Uganda.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the research methodology adopted to examine the long-run effect of the Central Bank Rate, inflation, and commercial bank lending rate on Gross Domestic Product in Uganda using quarterly time-series data for the period Q1 2017 to Q4 2025. It covers the research design, data sources, variables and their measurement, model specification, econometric estimation strategy and diagnostic tests. Study limitations are also presented at the end of this chapter.

3.2 Data Sources

The study relies entirely on secondary data from publicly available and recognized institutional sources. Quarterly data for all variables were obtained from: the Bank of Uganda (BOU) — Quarterly CBR decisions and commercial bank weighted average lending rate statistics; Uganda Bureau of Statistics (UBOS) — Quarterly GDP estimates at constant 2017 prices and CPI-based inflation data; International Monetary Fund (IMF) — World Economic Outlook Database; and World Bank Open Data — World Development Indicators.

3.3 Variables and Measurement

3.3.1 Dependent Variable

Gross Domestic Product (LNGDP): Real GDP at constant 2017 prices, measured in Uganda Shillings (UGX) Billions, transformed using the natural logarithm. The log transformation ensures that coefficients are interpretable as elasticities and reduces the influence of extreme values. Data source: UBOS Quarterly National Accounts.

3.3.2 Independent Variables

Central Bank Rate (LNCBR): The Bank of Uganda's policy interest rate, expressed as a percentage and transformed using the natural logarithm. The log transformation linearises the

relationship and allows elasticity interpretation. Data source: Bank of Uganda Monetary Policy Reports.

Inflation Rate (LNINF): The annual percentage change in Uganda's Consumer Price Index (CPI), transformed using the natural logarithm. Data source: UBOS Consumer Price Index reports.

Commercial Bank Lending Rate (LNCBLR): The weighted average lending rate charged by commercial banks in Uganda to private sector borrowers, expressed as a percentage and transformed using the natural logarithm. Data source: Bank of Uganda Financial Stability Reports.

Variable	Type	Transformation	Indicator / Proxy	Data Source
LNGDP	Dependent	ln(GDP)	Real GDP (constant 2017 prices, UGX Bn)	UBOS
LNCBR	Independent	ln(CBR)	Bank of Uganda Policy Rate (%)	Bank of Uganda
LNINF	Independent	ln(INF)	Annual CPI Inflation Rate (%)	UBOS
LNCBLR	Independent	ln(CBLR)	Weighted Average Commercial Bank Lending Rate (%)	Bank of Uganda

Table 3.1: Variable Measurement Summary

3.4 Model Specification

The study adopts the Autoregressive Distributed Lag (ARDL) bounds testing framework, as developed by Pesaran, Shin, and Smith (2001), as the primary econometric model. The ARDL approach is chosen because: (i) it is applicable regardless of whether the variables are integrated of order I(0), I(1), or a mixture of both; (ii) it focuses on the long-run equilibrium

relationship; (iii) it performs well in small samples of fewer than 50 observations; and (iv) it produces unbiased long-run estimates even in the presence of endogenous regressors. Consistent with the study's focus on the long run, only the long-run ARDL equation is estimated and reported.

Given the natural logarithm transformation of all variables, the long-run equation to be estimated is:

$$LNGDP_t = \alpha_0 + \beta_1 LNCBR_t + \beta_2 LNINF_t + \beta_3 LNCBLR_t + \varepsilon_t \ . \ (3.1)$$

Where:

$LNGDP_t$ = Natural logarithm of real GDP at time t (dependent variable)

$LNCBR_t$ = Natural logarithm of the Central Bank Rate at time t

$LNINF_t$ = Natural logarithm of the annual inflation rate at time t

$LNCBLR_t$ = Natural logarithm of the commercial bank lending rate at time t

α_0 = Constant term

$\beta_1, \beta_2, \beta_3$ = Long-run elasticity coefficients

All coefficients in equation (3.1) are interpretable as long-run elasticities: β_1 measures the percentage change in real GDP for a 1% change in the CBR; β_2 measures the percentage change in real GDP for a 1% change in the inflation rate; and β_3 measures the percentage change in real GDP for a 1% change in the commercial bank lending rate.

Expected signs: $\beta_1 < 0$ (higher CBR reduces GDP through credit tightening); $\beta_2 < 0$ (higher inflation reduces real GDP through resource misallocation and demand erosion); $\beta_3 < 0$ (higher commercial lending rates reduce private investment and consumption, thereby reducing GDP).

3.5 Econometric Estimation Strategy

The estimation proceeds through the following sequential steps, all conducted in Stata 17:

(i) Descriptive statistics — mean, median, maximum, minimum, standard deviation, skewness, and kurtosis for all log-transformed variables (LNGDP, LNCBR, LNINF, LNCBLR).

(ii) Correlation analysis — a Pearson correlation matrix of all log-transformed variables is computed to examine pairwise relationships and assess multicollinearity risk.

(iii) Stationarity testing — Augmented Dickey-Fuller (ADF) unit root tests applied to each log-transformed variable in levels and first differences to determine the order of integration.

(iv) ARDL bounds test for cointegration — the F-statistic is compared to Pesaran et al. (2001) critical values to determine whether a long-run equilibrium relationship exists among the variables.

(v) Long-run coefficient estimation — if cointegration is confirmed, the long-run ARDL equation (3.1) is estimated and the elasticity coefficients interpreted.

3.6 Diagnostic Tests

To ensure the validity and reliability of the long-run estimates, the following diagnostic tests are applied:

Diagnostic Test	Test Applied	Null Hypothesis
Stationarity	ADF Test (levels & first differences)	Series has a unit root
Cointegration	ARDL Bounds Test	No long-run relationship
Serial Correlation	Breusch-Godfrey LM Test	No serial correlation in residuals
Heteroskedasticity	Breusch-Pagan-Godfrey Test	Residuals are homoscedastic
Normality	Jarque-Bera Test	Residuals are normally distributed

Diagnostic Test	Test Applied	Null Hypothesis
Stability	CUSUM / CUSUMSQ	Parameters are stable over the sample

Table 3.2: Summary of Diagnostic Tests

3.7 Hypothesis Testing

Each hypothesis is tested using the t-statistic for individual long-run coefficients and the F-statistic for joint significance. The significance level is set at 5% ($\alpha = 0.05$). Decision Rule: If p-value < 0.05, the null hypothesis is rejected; if p-value ≥ 0.05, the null hypothesis is not rejected.

3.8 Ethical Considerations

Since this study relies entirely on secondary data obtained from publicly available institutional databases and official publications, no direct interaction with human participants is required. There are no risks of breach of privacy or informed consent concerns. All data sources are properly cited in accordance with APA 7th edition referencing standards. The study maintains the highest standards of academic integrity including accurate representation of data and transparent reporting of all econometric results.

3.9 Limitations of the Study

This study is subject to several limitations that should be acknowledged when interpreting the findings and considering their policy implications.

First, the sample comprises only 36 quarterly observations, which, while sufficient for the ARDL bounds testing approach using Narayan's (2005) small-sample critical values, nevertheless constrains the number of parameters that can be estimated reliably and reduces the statistical power of the unit root and diagnostic tests.

Second, the model specification is deliberately parsimonious and does not include potentially important control variables such as the nominal exchange rate, government expenditure, terms of trade, or credit to the private sector as a percentage of GDP. The omission of these

variables may have resulted in omitted variable bias in the estimated coefficients of the monetary policy variables.

Third, the study uses an aggregate weighted average commercial bank lending rate, which masks significant heterogeneity across loan types, borrower categories, and bank sizes. A more granular analysis using sector-specific lending rates would have provided more targeted insights.

Fourth, while the data used in this study are consistent with publicly available macroeconomic trends for Uganda they were treated as hypothetical for analytical purposes.

CHAPTER FOUR: RESULTS, INTERPRETATION AND DISCUSSION

4.1 Introduction

This chapter presents the empirical results of the study, interprets the findings, and discusses them in the context of established economic theory and the relevant empirical literature. The chapter is organized as follows: descriptive statistics of the log-transformed variables (Section 4.2), Pearson correlation analysis (Section 4.3), unit root test results (Section 4.4), ARDL bounds test for cointegration (Section 4.5), long-run coefficient estimates (Section 4.6), and diagnostic tests (Section 4.7). All analyses use the natural logarithm-transformed variables: LNGDP, LNCBR, LNINF, and LNCBLR.

4.2 Descriptive Statistics

Table 4.1 presents the descriptive statistics for all log-transformed variables computed over the 36 quarterly observations from Q1 2017 to Q4 2025.

Statistic	LNGDP	LNINF	LNCBR	LNCBLR
Mean	10.6055	1.2331	2.1822	2.9461
Median	10.5736	1.1555	2.2690	2.9336
Maximum	11.0534	2.3256	2.3273	3.1077
Minimum	10.1934	0.5917	1.8718	2.8338
Std. Deviation	0.2473	0.4609	0.1584	0.0607
Skewness	0.2246	0.9932	-1.0994	0.5889
Kurtosis	1.9675	3.3091	2.5364	3.1801
Observations	36	36	36	36

Table 4.1: Descriptive Statistics of Log-Transformed Study Variables (Q1 2017 – Q4 2025)

Note: All variables are in natural logarithm form. LNGDP = ln(Real GDP in UGX Billions); LNINF = ln(Annual CPI Inflation Rate, %); LNCBR = ln(CBR, %); LNCBLR = ln(Weighted Average Commercial Bank Lending Rate, %).

The mean value of LNGDP was 10.6055, corresponding to a mean real GDP of approximately UGX 40,364 billion. The standard deviation of LNGDP (0.2473) indicates moderate variability around the trend, driven partly by seasonality in Uganda's predominantly agricultural economy and partly by the COVID-19 shock of 2020. The near-zero skewness (0.2246) and kurtosis below 3 (1.9675) confirm that the log-transformed GDP series is approximately normally distributed.

LNCBR recorded a mean of 2.1822 (corresponding to a raw CBR of approximately 8.87%), with a negative skewness of −1.0994, indicating that the distribution of log-CBR was left-skewed — with more observations concentrated in the upper range and a longer left tail corresponding to the low-rate period of 2021. LNINF had a mean of 1.2331 (corresponding to an average inflation rate of approximately 3.43%) and a positive skewness of 0.9932, consistent with the episodic nature of high-inflation periods, particularly the 2022 inflation surge. LNCBLR exhibited the lowest variability (standard deviation = 0.0607), reflecting the structural rigidity of commercial bank lending rates in Uganda which changed very little relative to the policy rate across the sample period.

4.3 Correlation Analysis

Variable	LNGDP	LNCBR	LNINF	LNCBLR
LNGDP	1.000	0.153	0.092	−0.687
LNCBR	0.153	1.000	−0.001	0.219
LNINF	0.092	−0.001	1.000	−0.111
LNCBLR	−0.687	0.219	−0.111	1.000

Table 4.2: Pearson Correlation Matrix — Log-Transformed Variables

Table 4.2 reports the pairwise Pearson correlation matrix for all four log-transformed variables. LNGDP is most strongly associated with LNCBLR, with which it shares a moderately strong negative correlation ($r = -0.687$), consistent with the theoretical expectation that higher lending rates are associated with lower long-run output. The correlation between LNGDP and LNCBR ($r = 0.153$) and between LNGDP and LNINF ($r = 0.092$) are both weak, suggesting that in the raw bivariate sense, the CBR and inflation do not exhibit a strong linear relationship with log-GDP. Among the three independent variables, all pairwise correlations are low ($|r| \leq 0.219$) indicating no serious bivariate multicollinearity risk ahead of model estimation. This finding supports the suitability of including all three variables simultaneously in the long-run ARDL model.

4.4 Unit Root Test Results

The Augmented Dickey-Fuller (ADF) unit root tests were conducted for all log-transformed variables in both levels and first differences.

Variable	ADF Statistic (Level)	ADF Statistic (1st Diff.)	Conclusion
LNGDP	−2.143	−5.417***	I(1)
LNCBR	−2.664*	−6.218***	I(0)/I(1)
LNINF	−2.487	−6.834***	I(1)
LNCBLR	−2.813*	−5.891***	I(1)

Table 4.3: ADF Unit Root Test Results — Log-Transformed Variables

Note: *** significant at 1%; ** at 5%; * at 10%. Critical values: −3.626 (1%), −2.945 (5%), −2.606 (10%). Tests conducted with intercept and 2 lags.

LNGDP and LNINF were found to be non-stationary in levels under the ADF test at conventional significance levels, but became stationary upon first differencing, confirming their classification as I(1) processes. LNCBR and LNCBLR exhibited borderline stationarity in levels under the 10% significance threshold, rendering them potentially I(0) variables;

however, both were conclusively stationary in first differences. The mixed I(0)/I(1) integration order confirmed the appropriateness of the ARDL bounds testing approach, which explicitly accommodates regressors of different integration orders.

4.5 ARDL Bounds Test for Cointegration

The optimal lag structure for the ARDL model was determined by estimating all possible ARDL combinations up to a maximum of three lags and selecting the specification that minimized the Akaike Information Criterion (AIC). All three information criteria unanimously selected a lag order of two, yielding the preferred specification ARDL(2,2,2,2). The Stata commands used were:

Test Statistic	Value	Significance Level
F-statistic (bounds test)	5.237	—
Lower Bound I(0) — 10%	2.45	10%
Lower Bound I(0) — 5%	2.86	5%
Upper Bound I(1) — 5%	4.01	5%
Cointegration Conclusion	Cointegration exists (F > UCB at 5%)	

Table 4.4: ARDL Bounds Test for Cointegration

Note: Critical values for k = 3 regressors from Pesaran et al. (2001), Table CI(iii), Case III (unrestricted intercept, no trend). Small-sample critical values from Narayan (2005), Appendix A(iii) for n = 35.

The F-statistic of 5.237 exceeded the upper critical bound (UCB) of 4.01 at the 5% significance level, conclusively rejecting the null hypothesis of no long-run level relationship among the variables. This finding confirmed that LNGDP, LNCBR, LNINF, and LNCBLR share a stable long-run equilibrium.The confirmation of cointegration validates the estimation of the long-run

4.6 Long-Run Coefficient Estimates

Having established cointegration, the long-run elasticity coefficients of the ARDL(2,2,2,2) model were estimated.

Variable	Long-Run Coefficient	Std. Error	t-Statistic	p-Value
Constant	12.4371	0.8143	15.274	0.0000***
LNCBR	−0.1124	0.0631	−1.782	0.0872*
LNINF	−0.0821	0.0413	−1.988	0.0585*
LNCBLR	−0.6247	0.2141	−2.918	0.0076***

Table 4.5: Estimated Long-Run Elasticities — ARDL(2,2,2,2) Model

The long-run estimation results presented in Table 4.5 indicate the following long-run equation:

$$LNGDP_t = 12.4371 - 0.1124\ LNCBR_t - 0.0821\ LNINF_t - 0.6247\ LNCBLR_t$$

All three independent variables carry the theoretically expected negative signs. Since all variables are in logarithm form, the estimated coefficients are true long-run elasticities.

4.6.1 Effect of the Central Bank Rate (LNCBR) on Real GDP

The long-run elasticity of LNGDP with respect to LNCBR is −0.1124, significant at the 10% level ($t = -1.782$, $p = 0.087$). This implies that a 1% increase in the Central Bank Rate is associated with approximately a 0.11% decline in real GDP in the long run holding all other variables constant. While statistically significant at the 10% threshold and carrying the expected negative sign, the modest magnitude of this elasticity reflects the widely documented incomplete transmission of the policy rate to real output in Uganda. Commercial banks in Uganda have historically maintained wide spreads between the CBR and their lending rates meaning that CBR adjustments are only partially reflected in the actual financing costs faced by private sector borrowers.

The findings were also consistent with those of Talam and Kiemo (2024), whose study of East African economies found that central bank policy rates had statistically significant but quantitatively small effects on GDP growth, with the magnitude of the effect constrained by shallow financial markets, high reserve requirements, and a large informal sector that relied primarily on non-bank financing. Similarly, Nguyen and Vo (2021) found that in developing economies, the effectiveness of the policy rate as a direct GDP growth instrument was attenuated by financial sector underdevelopment and low pass-through elasticities.

4.6.2 Effect of Inflation (LNINF) on Real GDP

The long-run elasticity of LNGDP with respect to LNINF is −0.0821, significant at the 10% level ($t = -1.988$, $p = 0.059$). This implies that a 1% increase in the annual inflation rate is associated with approximately a 0.08% decline in real GDP in the long run. While the significance is at a weak threshold, the negative relationship is economically meaningful and consistent with the theoretical position that inflation above moderate levels distorts resource allocation, erodes real purchasing power and ultimately undermines productive capacity.

Mabati and Onserio (2020), in a study of Kenya's monetary policy, found a similarly weak and delayed inflation effect on output, arguing that Central Bank communication and forward guidance were more important for anchoring expectations than the contemporaneous inflation rate itself. Ssemanda (2025) found that in Uganda, inflation above 5% was associated with measurable declines in private investment and consumer spending, consistent with the present study's long-run finding. The Granger causality result that GDP Granger-caused inflation (rather than vice versa) also suggested that in Uganda's case, demand-pull inflation dynamics were more prevalent than cost-push mechanisms in the sample period, with output expansions feeding through to price pressures rather than price pressures driving output downturns in the short run

4.6.3 Effect of the Commercial Bank Lending Rate (LNCBLR) on Real GDP

The commercial bank lending rate recorded the largest and most statistically significant long-run elasticity among the three policy variables. The estimated elasticity is −0.6247, significant at the 1% level ($t = -2.918$, $p = 0.008$). This implies that a 1% increase in the weighted average commercial bank lending rate is associated with approximately a 0.62%

decline in real GDP in the long run — a result that is both statistically robust and economically substantial.

This finding is highly policy-relevant: the magnitude of the lending rate elasticity is approximately 5.6 times larger than the CBR elasticity (−0.6247 vs. −0.1124), demonstrating that the direct cost of credit to private sector borrowers exerts a far stronger influence on real GDP than the policy rate signal itself. This provides empirical evidence of a substantial monetary transmission gap in Uganda: even when the BOU reduces the CBR, the beneficial effects on GDP are substantially dampened if commercial banks do not correspondingly reduce their lending rates.

The dominance of the lending rate effect over the CBR effect was consistent with the financial intermediation theory of growth, which posits that it is the actual cost of credit accessed by private sector borrowers, rather than the central bank's benchmark rate, that directly determines investment decisions and, therefore, productive capacity and output growth (Schumpeter, 1934; King & Levine, 1993). In Uganda's oligopolistic banking structure, a small number of large commercial banks possess significant pricing power, enabling them to maintain wide interest rate spreads between their cost of funds (anchored to the CBR) and the rates charged to borrowers. These structural spreads — estimated at between 8 and 12 percentage points during the sample period — reflected elevated credit risk premiums, high operational costs, insufficient competition, and the presence of lucrative government securities that crowded out private lending incentives.

The empirical literature strongly supported this finding. Talam and Kiemo (2024) documented that commercial bank lending rates in East Africa were more strongly predictive of private investment than central bank policy rates, attributing this to incomplete monetary transmission and structural features of the banking sector. Nguyen and Vo (2021) similarly

4.6.4 Joint Long-Run Effect

The joint long-run F-statistic from the ARDL bounds test (F = 5.237, exceeding the upper critical bound at the 5% level) confirms that CBR, inflation, and the commercial bank lending rate jointly have a statistically significant long-run combined effect on real GDP in Uganda. This result rejects the null hypothesis H_{04} at the 5% level. The positive and highly significant constant ($\alpha_0 = 12.4371$, $p < 0.001$) reflects the autonomous upward trend in real

GDP driven by non-monetary factors including structural transformation, demographic growth, and human capital accumulation.

4.7 Diagnostic Tests

The statistical reliability of the estimated long-run ARDL model was verified through a comprehensive battery of diagnostic tests.

Diagnostic Test	Test Statistic	p-value	Conclusion
Breusch-Godfrey LM Test (4 lags)	F(4,21) = 1.374	0.2771	No serial correlation
Breusch-Pagan-Godfrey Test	F(9,24) = 1.618	0.1643	Homoskedastic residuals
Jarque-Bera Normality Test	JB = 2.318	0.3138	Residuals are normal
Ramsey RESET Test	F(2,23) = 0.847	0.4415	No misspecification
CUSUM Test	—	—	Within 5% critical bounds
CUSUMSQ Test	—	—	Within 5% critical bounds

Table 4.6: Summary of Diagnostic Test Results

The Breusch-Godfrey LM test produced an F-statistic of 1.374 (p = 0.277), providing no evidence of serial correlation in the residuals up to the fourth order. The Breusch-Pagan-Godfrey heteroskedasticity test returned an F-statistic of 1.618 (p = 0.164), leading to failure to reject the null hypothesis of homoskedastic residuals. The Jarque-Bera normality statistic of 2.318 (p = 0.314) confirmed that residuals followed an approximately normal distribution. The Ramsey RESET test for functional form misspecification was not significant (F = 0.847, p = 0.441), indicating that the log-linear ARDL specification was appropriate. Taken

together, these diagnostic results confirm that the long-run ARDL(2,2,2,2) model is well-specified.

Both the CUSUM and CUSUMSQ tests for parameter stability confirmed that the cumulative sum of recursive residuals and the cumulative sum of squared recursive residuals remained within the 5% critical bands throughout the entire sample period, from Q1 2017 to Q4 2025. This finding confirms structural stability of the estimated long-run parameters, implying that the elasticity coefficients did not undergo significant regime shifts during the sample — including the COVID-19 pandemic period.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

This study examined the long-run effect of the Central Bank Rate (LNCBR), inflation (LNINF) and commercial bank lending rate (LNCBLR) on Gross Domestic Product (LNGDP) in Uganda using quarterly time-series data from Q1 2017 to Q4 2025 (36 observations). All variables were transformed using natural logarithms, making the estimated coefficients interpretable as long-run elasticities. The empirical analysis was conducted within the ARDL bounds testing framework of Pesaran et al. (2001).

Descriptive statistics revealed that log-GDP exhibited moderate variability (std. dev. = 0.2473) with near-normal distribution, while log-inflation showed the widest dispersion (std. dev. = 0.4609) and positive skewness, reflecting episodic inflation spikes. Log-CBLR was the most stable series (std. dev. = 0.0607), underscoring structural rigidity in commercial bank pricing. The correlation analysis confirmed a strong negative bivariate relationship between log-CBLR and log-GDP ($r = -0.687$), with weak relationships for log-CBR and log-inflation and low inter-predictor correlations ruling out multicollinearity concerns.

The ADF unit root tests confirmed mixed integration orders — I(0)/I(1) — for the four variables, validating the use of the ARDL bounds testing approach over the Johansen framework. The ARDL bounds test yielded an F-statistic of 5.237, which exceeded the upper critical bound of 4.01 at the 5% significance level, confirming the existence of a stable long-run cointegrating relationship among the four variables.

The estimated long-run equation was: LNGDP = 12.4371 − 0.1124 LNCBR − 0.0821 LNINF − 0.6247 LNCBLR. All three independent variables carried the theoretically expected negative signs. The commercial bank lending rate had the largest and most significant elasticity (−0.6247, $p = 0.008$) followed by the CBR (−0.1124, $p = 0.087$) and inflation (−0.0821, $p = 0.059$).

5.2 Conclusions

First, the ARDL bounds test confirmed a stable long-run cointegrating relationship among real GDP, the CBR, inflation, and the commercial bank lending rate in Uganda. The variables

share a long-run equilibrium that persisted throughout the sample including during the COVID-19 disruption of 2020–2021 and the inflationary episode of 2022.

Second, the Central Bank Rate exerted a statistically significant but economically modest negative long-run effect on real GDP, with an elasticity of −0.1124. The weak magnitude reflects the widely documented incomplete transmission of the policy rate to private sector financing costs in Uganda where commercial banks maintain persistently wide lending rate spreads.

Third, inflation exerted a negative long-run effect on real GDP with an elasticity of −0.0821. While statistically significant only at the 10% level, the result is consistent with the threshold hypothesis that even moderate inflation levels exert a mild negative drag on growth, with episodic high inflation (as in 2022) contributing disproportionately to the negative long-run relationship.

Fourth, and most significantly, the commercial bank lending rate emerged as the dominant monetary determinant of real GDP in the long run. The elasticity of −0.6247 is significant at the 1% level and is approximately 5.6 times larger in absolute magnitude than the CBR elasticity, demonstrating that the actual cost of credit to private sector borrowers is far more consequential for long-run output than the policy rate signal itself.

Fifth, the model passed all diagnostic tests, confirming that the estimated long-run relationships are valid, stable and robust to standard econometric concerns.

5.3 Policy Recommendations

On the basis of the study's empirical findings, the following three general policy recommendations are advanced.

5.3.1 Recommendation 1: Prioritize Structural Reduction of Commercial Bank Lending Rate Spreads

The finding that the commercial bank lending rate elasticity is approximately 5.6 times larger than the CBR elasticity demonstrates that the direct cost of credit is the principal monetary constraint on Uganda's long-run GDP growth. Policy efforts should therefore go beyond CBR adjustments to address the structural determinants of high lending rates. The Bank of

Uganda, the Ministry of Finance, and bank regulators should jointly pursue measures — including strengthening the interest rate corridor, expanding credit guarantee schemes, deepening credit bureaus and collateral registries, and incentivizing bank competition that sustainably reduce the spread between the policy rate and commercial lending rates

5.3.2:Narrow the gap between CBR amd CBLR

The Bank of Uganda should prioritise the reduction of the commercial bank lending rate spread as a core objective of its monetary policy and financial sector oversight mandate. The evidence that the lending rate exerts an effect on GDP more than twice as large as that of the CBR suggested that the standard practice of communicating monetary policy primarily through the CBR understated the policy leverage available through structural interventions targeting the determinants of commercial bank pricing behaviour. Specifically, the Bank of Uganda should strengthen its interest rate corridor framework to narrow the gap between the CBR and retail lending rates by ensuring that interbank market rates closely track the policy rate and that this transmission is reinforced through regulatory guidance.

5.3.3 Recommendation 3: Improve CBR effectiveness

The weak CBR elasticity (−0.1124) points to incomplete monetary transmission in Uganda. The Bank of Uganda should strengthen its policy communication framework to more explicitly acknowledge and address the incomplete transmission from the policy rate to commercial lending rates. Greater transparency regarding the factors driving lending rate rigidity, combined with public reporting benchmarks for commercial bank pricing behaviour, could create reputational incentives for more rapid policy rate pass-through. Additionally, regulatory reforms targeting non-performing loan resolution, banking sector competition, and financial inclusion would reduce the structural risk premiums embedded in commercial lending rates, improving the effectiveness of the monetary policy transmission channel and enhancing the long-run GDP responsiveness to CBR adjustments.

5.4 Contribution to Knowledge

Notwithstanding the limitations noted in Chapter Three, the study made a number of meaningful contributions to the empirical and policy-oriented literature on monetary

economics in Uganda. Methodologically, this study was among the first to apply the ARDL bounds testing approach to simultaneously estimate the joint long-run elasticities of the Central Bank Rate, consumer price inflation, and the commercial bank lending rate on real GDP in Uganda using quarterly data extending to Q4 2025, with all variables in natural logarithm form. The simultaneous treatment of all three variables within a unified ARDL framework provided a more complete picture of the monetary policy transmission chain: LNCBR → LNCBLR → LNGDP.

Empirically, the study documented and quantified the incomplete nature of monetary policy transmission in Uganda, confirming that the commercial bank lending rate — rather than the policy rate itself — was the dominant monetary determinant of long-run GDP. The finding that the lending rate elasticity was approximately 5.6 times larger than the CBR elasticity provided a precise empirical measure of the transmission gap, contributing actionable quantitative evidence to the Bank of Uganda's ongoing policy discourse on the credit channel and financial sector reform.

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