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Asymmetric Impact of Interest Rate on Economic Growth in Kenya

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Abstract

Purpose: This study re-examines the relationship between interest rates and economic growth, focusing on the asymmetric effects of lending interest rates on Kenya's economic performance.
Design/Methodology/Approach: The study applied the nonlinear autoregressive distributed lag (NARDL) model to ascertain the distinct impacts of positive and negative interest rate shocks on economic growth in both the short and long run. It uses yearly time series data spanning the years 1980-2021.
Findings: The results of the cointegration tests found evidence supporting the existence of an asymmetric long-run relationship, while the Wald test results show that there is a long-run and short-run asymmetry link between interest rates and economic growth in Kenya. On average, positive changes in lending interest rates have no significant impact on economic growth in Kenya, both in the short and long run. However, negative interest rate shocks spur economic growth in the short run but impede growth in the long run.
Research Limitations/Implication: The study is limited to the Kenyan context and the dataset range of 1980–2021. Future research could explore thresholds for optimal interest rate levels and include a broader range of countries for comparative analysis.
Originality/Value: This study uniquely applies the NARDL framework to Kenya, providing new insights into the asymmetric impact of interest rates on economic growth.
Paper Type: Research Paper.

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INTRODUCTION

Introduction, theoretical and empirical literature synthesis

Beginning with the Asian Tiger economies and shifting to newly industrialised economies, such as China, South Africa, India, Russia and Brazil, the most powerful and successful strategy for poverty reduction is through sustained economic growth emanating from aggressive and rapid innovation and industrialisation (Chatterjee and Naka 2022; United Nations Industrial Development Organisation 2020). These two groups of countries pursued both export-oriented and import substitution strategies, while advancing innovative production technologies (Liu et al. 2023). While both monetary and nonmonetary factors can be drivers of economic growth, nonmonetary factors have received most of the attention in research studies. This insight serves as the motivation for this paper, which has two primary goals. The first is to thoroughly review and document the relationship between lending interest rates and economic growth in Kenya. Lending interest rates can have a significant impact on the rate and trajectory of economic growth by influencing the magnitude and return of investment, as well as the scope and composition of both saving and consumption. Infrastructure development, industrialisation, institutional investors, mutual funds, and the corporate sector are all exposed to risks stemming from interest rate volatility (Olasehinde-Williams et al. 2024).

The second is to bridge the gap in interest rate modelling by applying a model that can be used to quantify and comprehend the nature of the link between interest rates and growth in Kenya. Specifically, this study investigates the asymmetric impact of interest rates on economic growth in Kenya using time series data from 1980 to 2021. The nonlinear ARDL method captures the positive and negative changes asymmetrically and the short- and long-run dynamics of interest rates on economic growth in Kenya, enabling a more precise analysis across different economic conditions (see Saungweme et al. 2024; Shin et al. 2014). To the best of our knowledge, this is the first analysis of its kind conducted in Kenya, and it is unique since it employs an advanced estimation procedure that takes into account the asymmetrical characteristics of lending interest rates.

Therefore, the primary goals of this study are to complement previous growth research on Kenya and to support ongoing reforms in the areas of monetary, economic, and financial policy. These reforms are essential to preserving macroeconomic stability, preserving debt sustainability, strengthening market confidence, and enhancing the achievement of Kenya's medium-term growth prospects (International Monetary Fund/IMF 2024; Odhiambo and Saungweme 2023a; Saungweme and Odhiambo 2021). In addition, Kenya’s economy faces unique structural challenges and external shocks, such as fluctuating global interest rates and capital flows (IMF 2024). Therefore, understanding how interest rate fluctuations affect growth can provide insights into optimal policy decisions for sustainable development.

From a theoretical standpoint, there are multiple opposing hypotheses about the relationship between interest rates and economic growth. The first is a cogent explanation of the boom-bust pattern offered by the Austrian school of economic thought. That is, low interest rates from the central bank would encourage investment bubbles, which would then lead to a burst in asset prices, a financial crisis, and a severe recession (Foldvary 2015). The rate of interest is interpreted by the Austrian school as reflecting a methodical discounting of future values. The Austrian hypothesis states that the relationship between interest rates and economic growth typically revolves around the time preference issue. For example, increased productivity could encourage people to invest more now, making present-day investing more preferred over future investment (Holmes 2011). Furthermore, the market for loanable funds—funds that are accessible for borrowing—determines the interest rate (Foldvary 2015). Borrowers will be able to access more funding for consumption and investment at reduced interest rates. In general, Austrian economics holds that a central bank's manipulation of money and interest rates is what causes recessions; the best way to prevent these controls is to let the money supply and interest rates be determined by free market forces in money and banking.

Keynesian theory comes second. Keynes' approach to interest rate dynamics is in contradistinction with loanable funds theory. For Keynes, interest rate dynamics is based on his conception of ontological uncertainty, liquidity preference, investors’ expectations and animal spirits, financial institutions, financial markets, and institutional practices (Akram 2021). According to Keynes, the short-term interest rate is determined by the central bank's policy rate, which then affects the long-term interest rate (Akram 2021). These long-term interest rates then influence investment, saving and consumption decisions in the economy.

The McKinnon-Shaw hypothesis comes in third. In their original individual works, they contended that financial policies in developing and emerging economies, including low and restricted interest rates and restrictive credit management, among other financial repression acts, result in a decrease in savings, investment and economic growth (Wilson and Odhiambo 2023). McKinnon (1973) studied an economy in which the vast majority of investors had very limited access to external financing. In his view, savers may find it more convenient to build up their money in financial assets until they have sufficient funds to invest

in higher-yielding physical assets (Leshoro and Wabiga 2023). Thus, deposits can act as a channel for the accumulation of capital, rendering deposits and capital complementary assets. The availability of deposits with positive real rates of return may thus encourage both saving and capital accumulation.

In contrast to McKinnon, Shaw (1973) focused more on external rather than internal financing options as a fundamental constraint to capital formation. Shaw also underlined the significance of positive real deposit rates as an incentive to save in financially depressed economies. Shaw (1973) emphasised that high deposit rates might encourage investment spending by enabling the credit supply to grow in accordance with the financing requirements of the economy's productive sectors (Iddrisu and Alagidede 2020). Thus, McKinnon (1973) and Shaw (1973) suggest that low interest rates do not really increase investment and economic growth (Owusu 2023). After analysing the McKinnon-Shaw arguments, Mohlo (1986) came to the conclusion that deposits and physical capital complement each other in an intertemporal fashion, with current deposits being used to fund future investments. This link suggests that higher deposit rates inhibit investment in the short run but will eventually boost it in the long run.

There is currently little but growing empirical research on the link between interest rates and economic growth (Leshoro and Wabiga 2023; Adabor 2022). First, Leshoro and Wabiga (2023) looked at how both positive and negative interest rate shocks affect private investment in South Africa. The study employed annual time series data from 1971 to 2019 and a nonlinear autoregressive distributed lag technique. The results indicate that interest rates and private investment exhibit short-run and long-run asymmetric relationships, with private investment responding differently to negative and positive shocks in interest rates.

Second, by applying the NARDL approach, Adabor (2022) tested the asymmetric impact of lending interest rates on economic growth in Ghana using yearly time series data covering the period of 1970 to 2019. The study found evidence of long-run and short-run asymmetrical effects of lending on economic growth in Ghana. The findings further show that positive changes in lending rates generate a decrease of nearly 0.2% in economic growth while negative changes lead to an increase of about 0.7% in economic growth.

Other non-asymmetric studies conducted on the interest rate-growth linkage include Lee and Werner (2023), Shaukat et al. (2019), Awad and Al Karaki (2019). Lee and Werner (2023) analysed the impact of interest rates on economic growth in 19 industrialised and emerging economies. The analysis used a time-varying dynamic conditional correlation in a GARCH model and further tested the direction of causation between the two variables in the studied economies. The results provide evidence consistent with the conclusion that lowering interest rates is counterproductive when trying to stimulate the economy.

Awad and Al Karaki (2019) examined the impact of bank lending on economic growth in Palestine using quarterly time series data for the period from 1996 to 2015. The study employed the vector autoregressive model and vector error correction model, as well as the Granger causality test to test the underlying relationships. The study found that there was a statistically insignificant relationship between bank lending and economic growth. Additionally, there is evidence of unidirectional causality that runs from economic growth to bank lending.

Shaukat et al. (2019) studied the mechanism by which the real interest rate establishes a negative effect on economic growth in 38 transitory economies. The study applied a dynamic panel data technique based on the Generalised Method of Moments for the period 1996-2015. The study found that during the transition period of developing economies, a high real interest rate restricts the economy's potential to grow.

Considering the aforementioned theoretical stances and empirical evidence, the goal of this study is to empirically test the interest rate-growth relationship tailored to the Kenyan context. The remainder of the research is arranged as follows: Section 2 provides an overview of interest rates and economic growth trends in Kenya. Data, methodology, and estimation techniques are provided in Section 3. The empirical analysis is presented in Section 4, and the main conclusions and policy implications are summed up in Section 5.

Overview of interest rate and economic growth trends in Kenya

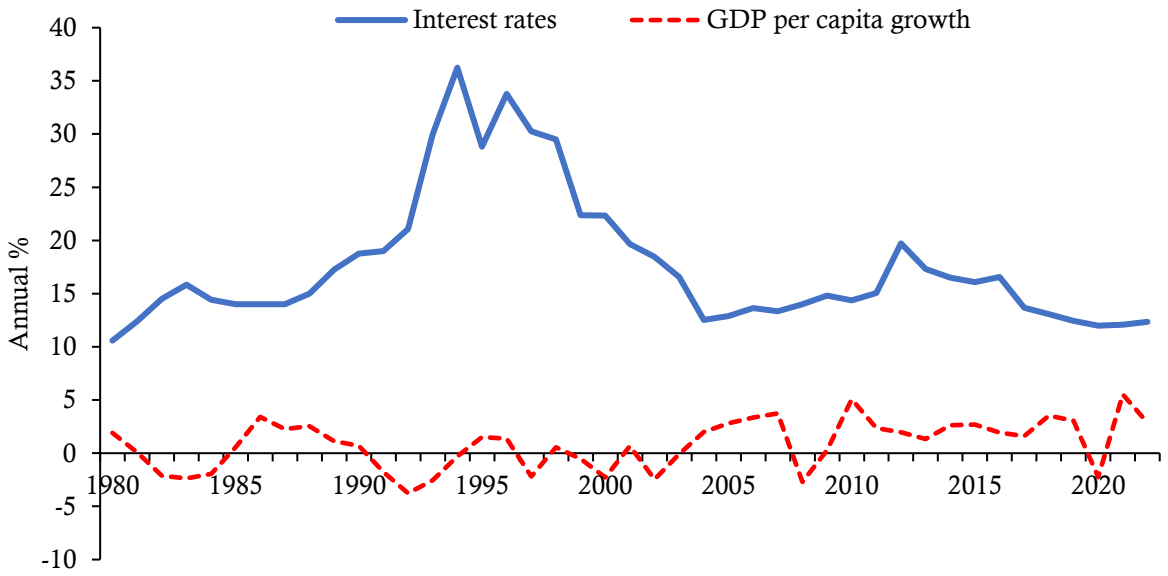
Kenya experienced a general balance of payments surplus from 1964 to 1972, with the exception of 1964, 1967, and 1971 (World Bank 2022). Interest rate policy in Kenya was largely dormant throughout this time. The government managed interest rates by setting minimum savings for all deposit-taking institutions and minimum lending rates for commercial banks, non-bank financial institutions, and building societies (Baynham 1989). A variety of internal and external causes, notably inflation brought on by a significant rise in oil prices and the consequences of a severe national drought in 1973, had a negative impact on the economy between 1972 and 1981 (IMF 1985). Following the shocks, the government re-examined its regulatory structure, which resulted in the progressive escalation of restrictions on imports, exports, interest rates, and domestic pricing.

Between 1974 and 1989, the monetary authorities in Kenya used an administered interest rate framework. The employment of statutory credit ceilings and minimum savings deposit rates was a crucial

tool for managing market liquidity (IMF 1991a). A revision to the credit ceiling policy between 1989 and 1991 resulted in the maximum rate being split between short-term and long-term lending (IMF 1991a). The major challenge with controlling interest rates was a widening gap between administered and effective bank lending rates. For this reason, the monetary authorities have been unable to sell enough quantities of government securities to limit the growth of the money supply (IMF 1991b).

The government then started a series of economic adjustment programs with the World Bank and IMF in 1991 and continued them until 1996. The overarching policy framework placed a strong emphasis on trade liberalisation, interest rate deregulation, and macroeconomic stabilisation (Obrien and Ryan 1999). In 1991, this framework resulted in a comprehensive liberalisation policy ideology. This philosophy is supported by the theoretical expectations of the McKinnon-Shaw hypothesis, which postulates that easing regulatory restrictions on interest rates will increase the volume of funds in deposit-taking institutions (McKinnon 1973; Shaw 1973).

Regarding economic growth, the years 1963 and 1973 can be regarded as a decade of exceptional growth, with an average annual real growth rate of 6.7% (World Bank 2022). The favourable weather and trade conditions for Kenya's commodity exports, along with the successful execution of the import-substitution program, all contributed to the country's impressive economic performance (Odhiambo and Saungweme 2023b). Between 1974 and 1979, the country underwent an economic recession marked by declining terms of trade and rising oil prices (IMF 2022). The period 1980-85 can be described as an era of macroeconomic imbalance and stabilisation, with low growth. Economic and monetary policy interventions between 1985 and 1989, which were further enhanced by the 1986 coffee boom, led to an economic rebound. For the first half of this period, real GDP increased by an average of 5.3% yearly (World Bank 2022). Figure 1 shows interest rates and GDP per capita growth rates for the period 1980 to 2022.



Source: Authors' compilation using World Bank (2022) data

Figure 1. Interest rate and economic growth trends in Kenya (1980-2022)

Figure 1 largely describes a negative correlation between interest rates and annual growth of GDP per capita in Kenya. Interest rates rose sharply during times of economic instability, such as 1980–1985, 1989–1992, 1995–1996, 2008, and 2019. Despite the series of economic reforms and monetary reforms, interest rates in Kenya remained high over the period under review, 1980-2022. These high interest rates on loans from the banking sector have been perceived by some policymakers as an obstacle to greater investment, financial inclusion, and economic growth (IMF 2019). As a result, the monetary authorities in Kenya were compelled to revert to managing interest rates in 2016. As a result, the observable flip in interest rates from 2016 is consistent with the capping of interest rates in Kenya, which went into effect that same year (Central Bank of Kenya/CBK 2018). According to the new rule, the maximum lending rate cannot be more than 4% over the base rate set by the central bank (CBK 2018).

However, the interest rate caps on commercial loans were lifted in 2019, and this is shown by an upturn in interest rates in Figure 1 (IMF 2021). The goal of eliminating interest rate ceilings in 2019 was to facilitate greater credit expansion and to stimulate private investment (IMF 2021). Despite the repeal, lending rates charged by banks have not increased significantly over the prior cap rate. In 2023, as part of an ongoing set of reforms, the Kenyan central bank established a new interest rate corridor to guide the

overnight interbank rate and reduce the premium for its discount (IMF 2024). The initiative was undertaken to further strengthen the monetary policy implementation framework. From the economic growth front, the notable downward spike in GDP per capita between 1990 and 1992 can be linked to the suspension of the balance of payments assistance from bilateral donors, while the downward spike in the 2019-20 period is attributable to the COVID-19 pandemic shock and ongoing volatility in the global financial system (see also IMF 2022).

METHODOLOGY

Data description

The study used annual time-series data from 1980 to 2021. The availability of reliable and consistent time-series data for each of the model variables for the study country influenced the selection of the data range. The data used in this study were obtained from the World Bank's online database. Table 1 presents the definition of variables, measurements, and expected signs.

Table 1. Definitions of variables and data sources

Variables	Definitions of variables (Measurements)	A priori expectation
Economic growth (Y)	GDP per capita (constant 2015 US$)	Dependent variable
Interest rate (INT)	Lending interest rate (%)	+/-
Investment (INV)	Gross fixed capital formation (% of GDP)	+
Financial development (CRED)	Domestic credit to private sector (% of GDP)	+
Trade openness (TO)	Trade (% of GDP)	+/-
Exchange rate (EXC)	Official exchange rate (LCU per US$, period average)	+/-

Model specification

The baseline model used in this study is defined as follows:

$$Y_t = f(INT, INV, CRED, TO, EXC) \quad (1)$$

Where Table 1 defines each variable.

In order to obtain elasticity coefficients on the variables and minimise the impact of outliers, the variables are converted to logarithms. Therefore, equation (1) is specified as follows:

$$lY_t = \alpha_0 + \beta_1 lINT_t + \beta_2 lINV_t + \beta_3 lCRED_t + \beta_4 lTO_t + \beta_5 lEXC_t + \mu_t \quad (2)$$

There is a vast array of literature that attempts to theorise the numerous causes of economic growth. The core tenet of the Harrod-Domar (H-D) model of economic growth is that increased production levels at the micro and macro levels are the result of a progressive accumulation of additional physical capital financed by savings and investments (Nguyen 2023). Subsequent to the H-D model is the Solow-Swan model, which emphasises the smooth substitution between capital and labour (Nguyen 2023). Early in the 20th century, financial depth and trade openness were recognised as crucial components of economic growth (Odhiambo and Saungweme 2023a). Nyasha et al. (2021), use GDP per capita as the dependent variable to facilitate cross-country comparisons of different population sizes. In other words, GDP per capita adjusts nominal GDP for changes in price levels and population growth.

The lending interest rate is the primary independent variable in this study. Theoretically, interest rates are regarded as the costs of borrowing investment and consumption funds from financial institutions. Bank lending rates are expected to either have a positive or negative relationship with economic growth. A decrease in lending rates is expected to induce borrowing for investment and consumption, hence leading to economic growth (Adabor 2022; Foldvary 2015). However, an increase in lending interest rates can lead to a decline in economic growth as it increases the cost of borrowing, which might discourage borrowing for investment and consumption, which is needed to grow the economy.

The incorporated control variables in model 1, namely investment, financial development, trade

openness, and exchange rate, are buttressed by both theory and prior empirical evidence; hence, it is anticipated that their coefficients will be statistically significant. The Solow-Swan model states that investment variations have an impact on total production up until steady-state per capita income is reached. This suggests that while investment has a significant role in determining growth in the short term, its impact on national output is essentially neutral over the long term. Empirical studies consistent with a positive relationship between investment and economic growth include Odhiambo and Saungweme (2023b) and Ibrahimov et al. (2023).

The inclusion of financial development in the model is due to the perceived positive spillover effects in an economy reliant on knowledge and technology, which ultimately leads to economic growth (Giri et al. 2023). Furthermore, the underlying theory supporting the inclusion of trade openness in the baseline model argues that trade openness either amplifies or attenuates the effects of globalisation, which in turn encourages technology transfer and foreign direct investment, which eventually influences economic growth (Chen et al. 2020). However, Baliamoune-Lutz and Ndikumana (2007), in their panel data analysis from 39 African countries covering the period 1975-2001, found evidence in support of a negative relationship between trade openness and economic growth. This relationship was caused by weak institutions in the studied economies.

The role of exchange rates in influencing economic growth cannot be understated, particularly in an analysis of a commodity-exporting country, such as Kenya. Overvalued currencies can be linked to macroeconomic instability, rent-seeking and corruption, unsustainable high current account deficits, foreign exchange shortages, and balance of payments crises (Rodrik 2008). All these factors are detrimental to economic growth.

Estimation techniques

This study applies a nonlinear autoregressive distributed lag (NARDL) model. The NARDL model explicitly captures the short-run and long-run asymmetries (positive and negative shocks) in lending interest rates on economic growth—a major advantage over linear vector autoregressive models. The cumulative dynamic multipliers of the NARDL model further explain the speed with which economic growth returns to equilibrium following a negative or positive shock in lending interest rates (Shin et al. 2014). The superiority of NARDL over other competing techniques is its ability to give reliable coefficients even in small samples, account for short-run volatilities and structural break problems in the data, account for endogeneity among all the variables, and its applicability to data with mixed orders of integration of at most one (Shin et al. 2014).

Thus, following Shin et al. (2014), interest rates can be decomposed into partial sums of positive changes and negative changes, making it possible to examine the marginal impact of the two components on economic growth in Kenya. This gives the following expression:

$$\mathrm{lY_t} = \eta^{+}\mathrm{lINT_t^{+}} + \eta^{-}\mathrm{lINT_t^{-}} + \mathrm{Z_t} + \xi_{1t} \tag{3}$$

where:

$$lINT_t^{+} = \sum_{k=1}^{t} \Delta lINT_t^{+} = \sum_{k=1}^{t} \max(\Delta lINT_k; 0) \tag{4}$$

$$lINT_t^{-} = \sum_{k=1}^{t} \Delta lINT_t^{-} = \sum_{k=1}^{t} \min(\Delta lINT_k; 0) \tag{5}$$

Where Δ change, Z is a set of control variables, ξ_{1t} is white noise error term.

Using equations (4) and (5), the NARDL framework as defined by Shin et al. (2014) is specified as*:*

$$\begin{aligned}\Delta lY_t = \kappa_0 &+ \sum_{i=1}^{\rho} \lambda_{1i}\Delta lY_{t-i} + \sum_{i=0}^{\upsilon 1} \lambda_{2i}^{+}\Delta lINT_{t-i}^{+} + \sum_{i=0}^{\upsilon 2} \lambda_{3i}^{-}\Delta lINT_{t-i}^{-} + \sum_{i=0}^{\upsilon 3} \lambda_{4i}\Delta lINV_{t-i} \\ &+ \sum_{i=0}^{\upsilon 4} \lambda_{5i}\,\Delta lCRED_{t-i} + \sum_{i=0}^{\upsilon 5} \lambda_{6i}\Delta lTO_{t-i} + \sum_{i=0}^{\upsilon 6} \lambda_{7i}\Delta lEXC_{t-i} + \psi_1 lY_{t-1} \\ &+ \psi_2^{+} lINT_{t-1}^{+} + \psi_3^{-} lINT_{t-1}^{-} + \psi_4 lINV_{t-1} + \psi_5 lCRED_{t-1} + \psi_6 lTO_{t-1} \\ &+ \psi_7 lEXC_{t-1} + \xi_{2t}\end{aligned} \tag{6}$$

Where $\rho;\ \upsilon 1 - \upsilon 6$ is optimal lag order, κ_0 is constant, $\lambda_1, \lambda_4, \lambda_5, \lambda_6, \lambda_7\ and\ \lambda_8$ are short-run

coefficients, $\lambda_{2i}^{+}\ and\ \lambda_{2i}^{-}$ are short-run asymmetric distributed lag parameters, $\psi_1, \psi_4, \psi_5, \psi_6, \psi_7 and\ \psi_8$ are long-run coefficients, $\psi_2^{+}\ and\ \psi_2^{-}$ are long-run asymmetric distributed lag parameters, ξ_{2t} is white noise error term, t is time period and *l* is natural logarithmic transformation. All other variables are as defined in Table 1.

Cointegration in a NARDL model setting is ascertained by comparing the computed F-statistic to the upper and lower critical bounds from Pesaran et al. (2001) critical values. The asymmetric impact of lending interest rates on economic growth in Kenya is ascertained if $\psi_2^{+} \neq \psi_3^{-}$. If this condition holds, then the following error correction model (ECM) is specified:

$$lY_t = \kappa_0 + \sum_{i=1}^{\rho} \lambda_{1i} \Delta lY_{t-i} + \sum_{i=0}^{v1} \lambda_{2i}^{+} \Delta lINT_{t-i}^{+} + \sum_{i=0}^{v2} \lambda_{3i}^{-} \Delta lINT_{t-i}^{-} + \sum_{i=0}^{v3} \lambda_{4i} \Delta lINV_{t-i} + \sum_{i=0}^{v4} \lambda_{5i}\, \Delta lCRED_{t-i} + \sum_{i=0}^{v5} \lambda_{6i} \Delta lTO_{t-i} + \sum_{i=0}^{v7} \lambda_{7i} \Delta lEXC_{t-i} + \phi ECM_{t-1} + \xi_{3t} \quad (7)$$

Where ϕ is coefficient of the error term and ECM is error correction term.

To confirm convergence to long-run equilibrium following a shock or short-term disequilibrium, the coefficient of the error correction term (ϕ) is anticipated to be negative and statistically significant, lying between 0 and 1.

The current paper makes use of time series data, so it is necessary to pre-test each variable for unit root in order to prevent spurious regressions and to determine the order of integration for each variable. According to Pesaran et al. (2001) and Shin et al. (2014), the NARDL model requires that no variable be integrated of an order higher than one. To distinctly determine the order of integration, the paper uses three techniques, namely, the Dickey-Fuller Generalised Least Square (DF-GLS), Phillips-Perron (PP) and Zivot-Andrews (ZAURoot) techniques. The paper incorporates the ZAURoot technique so as to correct for structural breaks and, therefore, correctly determine the order of integration among the variables.

After ascertaining the order of integration for each variable, the paper then conducts a cointegration test to ascertain the applicability of the NARDL process. The paper also undertakes nonlinearity tests in the series using the BDS test. The null hypothesis of linearity, under various BDS dimensions (m = 2, 3, 4, 5, 6), is put to the test. The Wald test is also included in this paper to check for both short-run and long-run asymmetries. After undertaking these preliminary checks, the paper proceeds to estimate the asymmetrical long- and short-run effects of lending interest rates on economic growth using equations 5 and 6. Finally, the paper carries out post-diagnostic tests, including the recursive CUSUM and CUSUMSQ tests, to check the null hypothesis that the parameters are unstable. The dynamic multiplier tests further show graphically the rate of response of economic growth to positive and negative variations in interest rates (see Shin et al., 2014).

RESULTS AND DISCUSSION

Nonlinearity and stationarity results

The study first determines whether the series has a nonlinear relationship. The findings are shown in Table 2. There is evidence indicating the existence of a nonlinear relationship between the series in Table 2. This result is confirmed by the BDS test statistics for each variable, which were found to be statistically significant at 1% across all dimensions. Panels A, B, and C of Table 3 provide a summary of the three stationarity test results. The results of the DF-GLS test show that investment is stationary at all levels [I(0)], while GDP per capita, trade openness, and exchange rate are all conclusively stationary after first differencing [I(1)]. According to the findings of the PP and ZAURoot tests, all series are conclusively integrated of order one (1). Overall, the stationarity results indicate that the order of integration of the variables is a mixture of not more than 1. This attests to the appropriateness of using the bounds test to investigate the long-run relationship between interest rates and GDP per capita in Kenya.

Table 2. BDS Test results for nonlinearity

Variables	BDS Statistic									
	Dimension 2		Dimension 3		Dimension 4		Dimension 5		Dimension 6	
	BDS Statistic	P-value	BDS Statistic	P-value	BDS Statistic	P-value	BDS Statistic	P-value	BDS Statistic	P-value
lY	0.153***	0.000	0.239***	0.000	0.274***	0.000	0.279***	0.000	0.251***	0.000
lINT	0.146***	0.000	0.237***	0.000	0.290***	0.000	0.318***	0.000	0.326***	0.000
lINV	0.070***	0.000	0.100***	0.000	0.110***	0.000	0.107***	0.000	0.093***	0.000
lCRED	0.105***	0.000	0.153***	0.000	0.180***	0.000	0.184***	0.000	0.170***	0.010
lTO	0.132***	0.000	0.193***	0.000	0.201***	0.000	0.169***	0.000	0.113***	0.000
lEXC	0.203***	0.000	0.343***	0.000	0.442***	0.000	0.510***	0.000	0.558***	0.000

Notes: *** denote statistical significance at 1% leve1.

Table 3. Stationarity results

Panel A: Dickey-Fuller Generalised Least Square (DF-GLS)				
Variable	Level		First Difference	
	Without Trend	With Trend	Without Trend	With Trend
lY	1.488	-0.434	-4.021***	-4.814***
lINT	-1.217	-1.425	-4.591***	-5.611***
lINV	-2.774***	-2.980*	___	___
lCRED	-1.196	-3.094*	-7.389***	-7.882***
lTO	-0.605	-1.974	-6.602***	-6.608***
lEXC	0.086	-1.073	-4.368***	-5.705***
Panel B: Phillips-Perron (PP)				
	Level		First Difference	
	Without Trend	With Trend	Without Trend	With Trend
lY	1.419	-0.323	-3.949***	-4.710***
lINT	-1.862	-2.061	-5.432***	-5.606***
lINV	-2.732*	-2.890	-11.123***	-11.332***
lCRED	-1.102	-3.521*	-8.038***	-7.958***
lTO	-0.888	-1.848	-6.605***	-6.655***
lEXC	-3.207**	-1.772	-5.039***	-5.615***

Panel C: Zivot-Andrews (ZAURoot)								
	Level				First Difference			
	Without Trend	Break	With Trend	Break	Without Trend	Break	With Trend	Break
lY	-2.466	1992	-3.339	2000	-5.441***	1991	-5.730***	1990
lINT	-2.936	1989	-3.177	1999	-6.836***	1995	-7.043***	1995
lINV	-4.198	1996	-4.261	1996	-6.443***	2000	-6.415***	2000
lCRED	-3.765	2006	-4.018	2006	-6.464***	1991	-7.196***	2013
lTO	-3.635	2015	3.814	2010	-6.906***	1988	-7.147***	1995
lEXC	-4.254	1991	-6.761***	1993	-6.276***	1995	-6.571***	1994

Notes: ** and *** denotes statistical significance at 5% and 1% level.

Cointegration and asymmetric test results

Table 4 displays the outcomes of the cointegration tests carried out utilising the NARDL bounds testing methodology. The results show that the F-statistic value for the NARDL model is 4.215 and is statistically significant at the 5% level. This suggests that the variables in the nonlinear model have a cointegrating correlation. The Wald test results presented in Table 5 firmly reject the null hypothesis of long-run and short-run symmetry. This is confirmed by the associated long-run and short-run p-value of the Wald F-statistic (W_{LR}), which is statistically significant at 1%, and $W_{SR,}$ which is significant at the 10% level. This finding implies that interest rates have a distinct long-run and short-run asymmetric effect on economic growth in Kenya.

Table 4. Bounds F-test results for cointegration – NARDL

F-Statistic			**Cointegration Status**			
Pesaran et al. (2001), p.300, Table CI(iii) Case III	4.215**		Cointegrated			
	Asymptotic critical values for					
	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
	2.53	3.59	2.87	4	3.6	4.9

Notes: **denotes statistical significance at 5% level.

Table 5. Wald test results

Test	**F-statistic**	**P-value**	**Decision**
W_{LR}	9.201***	0.007	Asymmetric
W_{SR}	4.046*	0.056	Asymmetric

Notes: W_{LR} is long-run asymmetric test; W_{SR} is short-run asymmetric test; *** and * signifies significance at 1% and 10% level.

Long-run and short-run NARDL results

Table 6, panels A and B, presents the long-run and short-run NARDL results, respectively.

Table 6. NARDL results - long-run and short-run coefficients

Dependent Variable is Y		
Panel A: Long-Run Results		
Regressor	**Coefficient**	**T-ratio [p-value]**
lINT^{+}	-0.086	-0.980 [0.339]
lINT^{-}	0.461***	4.399 [0.000]
lINV	-0.043	-0.269 [0.791]
lCRED	0.066	0.570 [0.575]
lTO	0.056	0.480 [0.637]
lEXC	-0.322***	-4.174 [0.001]
Panel B: Short-Run Results		
Regressor	**Coefficient**	**T-ratio [p-value]**
C	4.229***	6.225 [0.000]
@Trend	0.031***	6.335 [0.000]
$\Delta\mathrm{lINT}^{+}$	0.030	0.721 [0.480]
$\Delta\mathrm{lINT}^{-}$	0.041	1.278 [0.217]
$\Delta\mathrm{lINT}^{-}(-1)$	-0.178***	-3.989 [0.001]
$\Delta\mathrm{lINT}^{-}(-2)$	-0.120***	-3.297 [0.004]
ΔlINV	0.057*	1.817 [0.085]
$\Delta\mathrm{lINV}(-1)$	0.131***	4.327 [0.000]
ΔlCRED	-0.089***	-3.097 [0.006]
$\Delta\mathrm{lCRED}(-1)$	-0.076**	2.408 [0.026]
ΔlTO	0.056*	2.052 [0.054]
$\Delta\mathrm{lTO}(-1)$	-0.061**	-2.254 [0.036]
ΔlEXC	-0.183***	-3.972 [0.001]
$\mathrm{ECM}(-1)$	-0.567***	-5.904 [0.000]
Panel C: Test statistics		
R- Squared	0.793	
R-Bar-Squared	0.693	
F-Statistic [Prob]	7.959 [0.000]	
Normality	0.779 [0.677]	
Serial Correlation	0.969 [0.400]	
Heteroscedasticity	1.007 [0.493]	
Functional Form	0.879 [0.361]	

Notes: *, ** and *** denote statistical significance at 10%, 5% and 1% levels, respectively "+" and "-" denotes positive and negative shocks.

The NARDL results, which are reported in Table 6, indicate that positive changes in interest rates ($lINT^{+}$) have no significant impact on economic growth, irrespective of whether the analysis is conducted in the short run or in the long run. The results also indicate that negative changes in interest rates ($lINT^{-}$) and economic growth move in the same direction, as evidenced by the positive and statistically significant coefficient of the negative partial sum of interest rates. This suggests that, other things being equal, negative shocks to interest rates are likely to be accompanied by a corresponding decline in economic growth in the long run. One reason for this could be that when the central bank lowers interest rates, economic agents save less because they will not be earning higher returns on their savings. The low saving rate can lead to a lower level of investment, which could contribute to a decrease in economic growth.

The results also indicate that there is an inverse relationship between negative changes in lending interest rates from the preceding period and economic growth in the short run. This is supported by the coefficient of the partial negative sum of interest rates, which has been found to be negative and statistically significant. This indicates that decreases in interest rates have the potential to spur economic growth in the short run, as lower rates can incentivise borrowing for both investment and consumption. The major findings of this study indicate that negative changes in interest rates have an asymmetrical impact on economic growth in Kenya, depending on the direction of change and the time scale taken into account. Overall, based on these conclusions, the study concludes that negative interest rate changes play a significant role in defining the country's possibilities for future prosperity.

The results of control variables reported in panels A and B show that investment has a significant positive impact on economic growth in Kenya, only in the short run. This finding is consistent with the principles of H-D and Solow-Swan models presented in earlier sections. The findings of financial development point to detrimental effects on economic growth exclusively in the short run, while it is statistically insignificant in the long run. Trade openness has been shown to promote economic growth in the short run, but the results also indicate that trade openness from previous periods causes economic decline. While the adverse effects of financial development may indicate a small financial sector vulnerable to adverse financial developments in international markets, Baliamoune-Lutz and Ndikumana (2007) contend that weak institutions to facilitate reciprocal trade benefits are the root cause of the negative correlation between trade openness and economic growth (see also, IMF, 2024). Furthermore, it was shown that changes in exchange rates have a negative impact on economic growth in the long and short run. This implies that a depreciation of the exchange rate in Kenya is likely to boost exports and increase economic growth.

The dynamic multiplier graph presented in Figure 2 validates the presence of an asymmetric relationship between interest rates and economic growth. Explicitly, the black dotted line indicates the non-linear adjustment of economic growth to negative shocks, while the solid black line portrays the adjustment of economic growth to positive shocks. Overall, the dynamic multiplier reported in Figure 2 shows that the effects of positive shocks to interest rates are more pronounced than those of negative shocks in the long run.

The CUSUM and CUSUMSQ graphs presented in Figure 3 are within the bounds at a 5% significance level, implying that the estimated model passes the stability test, confirming the consistency and reliability of the coefficients.

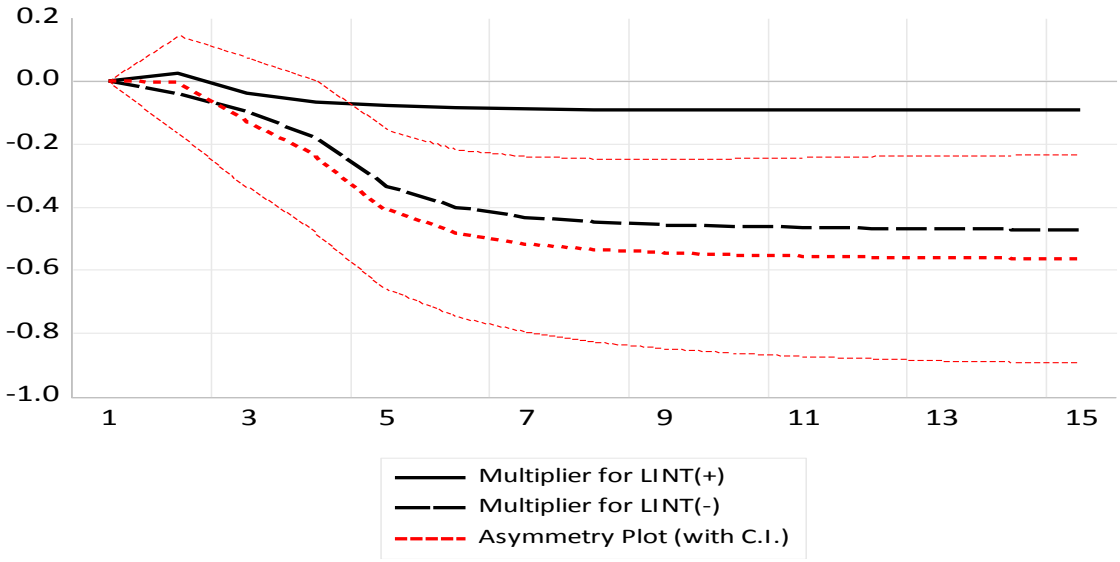


Figure 2. Dynamic multiplier graph

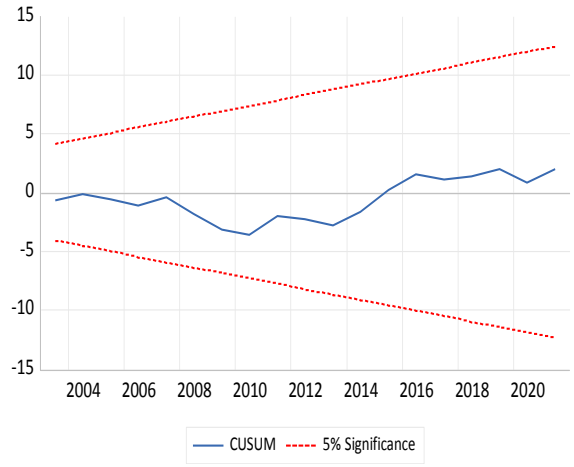


Figure 3a. CUSUM graph

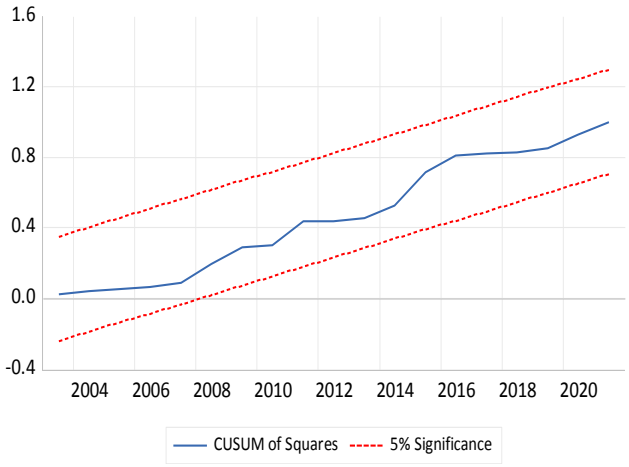


Figure 3b. CUSUMSQ graph

CONCLUSION AND RECOMMENDATIONS

The economic and monetary policies of Kenya underwent significant evolution from 1964 to 2023. Initially characterised by dormant interest rate policies managed through statutory controls, the landscape shifted by 1991 as internal and external shocks prompted economic adjustments emphasizing trade liberalisation and interest rate deregulation. Therefore, this study extended the investigation of the asymmetric impact of lending interest rates on economic growth in Kenya using a nonlinear ARDL model and annual time-series data spanning the years 1980-2021. Unlike some of the previous studies, which used linear models, this research employed the NARDL framework to examine the short- and long-run asymmetric impact of lending interest rates on economic growth in Kenya, providing an intricate understanding of the interest rate-growth nexus. The findings underscore the existence of an asymmetric long-run relationship, as evidenced by cointegration and dynamic asymmetry tests. Specifically, while positive shocks in lending interest rates exhibit no significant impact on economic growth, negative interest rate changes are shown to spur growth in the short run but impede it in the long run. Short-run benefits of lower interest rates stem from increased borrowing for productive investments, enhanced consumption, and the stimulation of export-driven industries such as agriculture and manufacturing, owing to currency depreciation. Conversely, prolonged interest rate reductions may deter savings and compromise long-term investment, posing challenges to sustained economic growth. Investment, financial development, trade openness, and exchange rates were found to play critical roles in moderating the growth trajectory, though their effects varied across time horizons.

Policy suggestions from this paper are: (1) Policymakers should carefully balance short-term stimulus policies with long-term sustainability by avoiding extreme interest rate fluctuations. Short-term measures should focus on reducing lending rates during economic slowdowns to encourage borrowing for investment, entrepreneurship, and job creation. (2) Given that investment positively affects economic growth in the short run, particularly with a lag, policymakers should implement short-term measures to stimulate both private and public investments, such as subsidies and credit facilities. Since investment also contributes to long-term economic growth, authorities should establish sustainable financing mechanisms, such as public-private partnerships for infrastructure projects. (3) As credit to the private sector has a negative impact on economic growth in the short run, financial regulators should closely monitor excessive lending to ensure that credit allocation supports productive sectors rather than speculative activities. Authorities should promote responsible lending through macro-prudential policies while also developing robust credit risk management frameworks and fostering financial literacy to enhance the positive long-run effects of financial intermediation. (4) Since exchange rate depreciation negatively affects economic growth in both the short and long run, the central bank should continuously monitor exchange rate fluctuations and, when necessary, implement appropriate monetary policies - within the bounds of its existing free-floating exchange rate system - to smooth out extreme and undesirable movements. (5) Export diversification strategies should be encouraged to reduce vulnerability to external shocks and enhance economic resilience.

Future studies on the subject should extend the analysis to estimate the threshold point of lending interest rates that would set the country on an optimal growth path. Additionally, the scope of analysis should be broadened to include other African economies to uncover regional trends and policy implications.

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