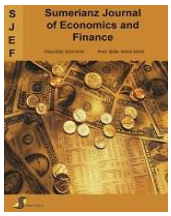
Sumerianz Journal of Economics and Finance, 2024, Vol. 7, No. 3, pp. 31-39
ISSN(e): 2617-6947, ISSN(p): 2617-7641
Website: https://www.sumerianz.com
DOI: https://doi.org/10.47752/sjef.73.31.39



Original Article Open Access

Impact of Consumer Price Index and Exchange Rate on Economic Growth in Nigeria

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Article History

Received: 20 June, 2024

Revised: 9 September, 2024

Accepted: 18 September, 2024

Published: 27 September, 2024

How to Cite

Gimba Victor Kyari andAhmadu Ezekiel. (2024). Impact of Consumer Price Index and Exchange Rate on Economic Growth in Nigeria. *Sumerianz Journal of Economics and Finance*, 7(4): 31-39.

Abstract

The main objective of this study is to investigate the impact of consumer price index and exchange rate on economic growth in Nigeria over the period 1992 to 2023. First, the study carried out unit root test to check the stationarity state of the variables using the ADF method and findings show that the variables have the combination of I(1) and I(0). Thereafter, the study conducted cointegration test using the bounds testing method and findings revealed that the variables have long run relationship. Subsequently, the Autoregressive Distributed Lag (ARDL) model was applied to estimate the parameters of the model and the results show that in the short run a 1% increase in the consumer price index will result in a 0.004395% significance decrease in economic growth at 5% level. Likewise the long run estimate revealed that a 1% increase in consumer price index results in a 0.085575% significance decrease in economic growth at 5% level. The results also showed that in the short run a 1% increase in the exchange rate will bring about a 0.023529% insignificance decrease in economic growth. In contrast, the long run estimate showed that a 1% increase in the exchange rate would result in a 1.174762% significance increase in economic growth. Additionally, the results also show that the interaction of consumer price index and interest rate has positive impact on economic growth. Based on the results, the study recommended that Nigerian government should address supply-side constraints by investing in infrastructure, boosting agricultural productivity, and enhancing the manufacturing sector which would help reduce the cost of production and stabilize prices, thereby curbing inflation from both demand and supply sides. Likewise, Nigerian government should prioritize stabilizing the exchange rate by diversifying its economy away from excessive reliance on oil export which is the main source of country's revenue. The economy should be diversified to boost non-oil sectors such as agriculture, manufacturing, and technology which can enhance its export base, attract foreign direct investment, and build a resilient economy that is less susceptible to exchange rate fluctuations.

Keywords: Economic Growth, Exchange Rate, *consumer price index*, Diversification.

1. Introduction

Economic growth is widely recognized as an important macroeconomic variable that serves as one of the indicators to measure the growth and progress of a nation. This is because it signifies enhancements in a nation's ability to produce goods and services, which typically lead to higher incomes and improved standards of living. Economic growth is influenced by various factors, with the inflation rate being a critical one. This is because when there is an increase in inflation rate, consumers may struggle to afford goods and services, as their incomes are not able to keep up with the rising prices which can lead to a decrease in consumer spending and low economic growth

Generally, developed countries tend to have lower levels of inflation compared to developing countries because developed countries have more stable and mature economies, which are better equipped to deal with inflationary pressures (Romdhane *et al.*, 2023). Conversely, in underdeveloped countries, inflation rates tend to be more volatile and can often spiral into hyperinflation which will results in a sharp decline in the value of the currency and a

subsequent loss of confidence in the economy, severely hampering economic stability and growth. According to the data released by International Monetary Fund (2023) on average consumer prices, the average inflation rate in the emerging market and developing economies amounted to about 8.34% percent compared to the previous year while that of advanced economies is 2.6%.

In the case of Nigeria, the economy has been significantly strained by the challenges of inflation. According to data released by the National Bureau of Statistics (2024) on consumer price index, Nigeria's inflation rate rose to 33.69% in April 2024 compared to March 2024 headline inflation rate which was 33.20%. The inflation rate in Nigeria has been driven by several factors, including high food prices, increased costs of imported goods due to foreign exchange scarcity, and rising fuel prices. These inflationary pressures erode the purchasing power of Nigerians, reduce savings, and increase the cost of living, making life particularly difficult for low-income households.

Furthermore, apart from inflation rate, another factor the influence economic growth is the exchange rate. One of the primary ways in which exchange rates affect economic growth is through international trade. When a country's currency depreciates, its exports become cheaper for foreign buyers, leading to an increase in demand for those products. This, in turn, can boost economic growth by increasing export revenues and creating jobs in the exporting industries. The developed nations often enjoy stable and strong exchange rates compare to developing countries because these countries typically have strong and diverse economies that are less susceptible to sudden fluctuations and they also have well-established stable government's fiscal policies in place to help maintain stable exchange rates (Ali *et al.*, 2023). The economic data released by Forbe Advisors (2023) on top 10 strongest currencies in the world has shown that the Kuwaiti dinar is identified as the strongest currency globally, with 1 dinar buying 3.26 dollars. Conversely, the Iranian rial and the Sierra Leonean leone are identified as the weakest currencies in the world, with 1 rial buying a mere 0.000024 dollars and 1 leone purchasing 0.000057 dollars, respectively, as reported by Forbe Advisors (2023).

In Nigeria, the economy has been significantly strained by the challenges of exchange rate with the exchange rate stood at N1,548.25/$1 in June 2024, according to the data released by Central Bank of Nigeria (2024) on exchange rate quarterly data. The exchange rate instability has exacerbated economic difficulties leading to increased import costs, fueling further inflation. This volatility undermines investor confidence, disrupts trade, and complicates economic planning for businesses relying on foreign inputs. It is on this background this study seeks to investigate the impact of *consumer price index* and exchange rate on economic growth in Nigeria.

2. Literature Review

Inflation rate, exchange rate and economic are crucial concepts in the world of economics and have been defined by different scholars. Inflation rate was defined by Atikah *et al.* (2023) as a general increase in prices of goods and services within an economy over a period of time which served as a working definition of this study. Likewise, another definition of inflation rate was given by Kpangbala (2023) which is an increase in the supply of money in an economy that is not matched by a corresponding increase in the supply of goods and services.

Furthermore, when defining exchange rate Vo and Vo (2023) considered it as the price of one currency in terms of another. Similarly, Sethar *et al.* (2024) defined exchange rate as the rate at which one currency can be exchanged for another in the foreign exchange market. The above definition by Sethar *et al.* (2024) serves as the working definition of this study. In the same manner, Witjaksono *et al.* (2023) defined exchange rate as the mechanism by which countries set the value of their currencies against a fixed standard, such as gold or another currency.

The next concept that this study considers is economic growth. According to Vîrjan *et al.* (2023) economic growth is the increase in a country's production of goods and services over time. In the same manner, Maganya (2020) defined economic growth as an increase in the monetary total value of all goods and services produced in a country within a specific period, usually a year. The definition given by Maganya (2020) serves as the working definition of this study.

Furthermore, the relationship between inflation rate and economic growth has been link to economic theories. One theory that explains this relationship is the Endogenous Growth Theory pioneered by economists such as Paul Romer and Robert Lucas (Chang *et al.*, 2024). According to this theory economic growth is primarily determined by internal factors rather than external forces. It emphasizes the importance of investments in human capital, innovation, and knowledge, suggesting that these elements can lead to persistent growth without the necessity of exogenous technological changes (Lucas, 1988; Romer, 1986). The theory stresses that policies and conditions that influence these internal factors can significantly impact economic growth rates. In this context, inflation and exchange rates are critical because they affect the stability and predictability necessary for fostering internal investments in education, research and development (R&D), and physical capital. In the case of Nigeria, the country has experienced fluctuating inflation rates reaching double digits. Such instability disrupts economic planning and investment, which are crucial for endogenous growth. High inflation discourages savings and makes long-term investments in human capital and R&D less attractive.

Another theory that this study considered is the Quantity Theory of Money which is historically dates back to classical economists such as David Hume and John Stuart Mill but was meticulously formalized by Irving Fisher in the early 20th century (Hendrickson, 2023). Fisher encapsulated the theory in his famous equation of exchange as follows:

$$MV = PQ \quad \ldots\ldots 2.1$$

Where M represents the money supply, V is the velocity of money, P represents the price level, and Q stands for the quantity of goods and services produced (Fisher, 1911). This equation implies that any change in the money

supply (M), assuming a constant velocity of money (V), directly affects the price level (P), provided that the quantity of goods and services (Q) remains unchanged. According to this theory, inflation is caused by an increase in the money supply without a corresponding increase in the production of goods and services. This theory suggests that high levels of inflation can hinder economic growth by eroding consumer purchasing power and reducing overall economic efficiency.

Having reviewed the theories that this study utilized, the theoretical framework for the study would be based on the endogenous growth model. The endogenous growth model introduces a modification to the Cobb-Douglas production function, emphasizing the role of knowledge, human capital, and innovation as primary drivers of growth. One fundamental form of the endogenous growth model is expressed as:

$$Y = AK^{\alpha} L^{\beta} \quad \text{..3.1}$$

Where: Y represents the total output (GDP), A symbolizes a constant representing the level of technology, A stands for the total capital stock, L denotes labor, alpha and beta are the output elasticities of capital and labor, respectively. In endogenous growth theory, technology and its growth rate are often endogenously determined rather than exogenously given, which a hallmark feature is distinguishing it from the Solow-Swan exogenous growth model. Incorporating Human Capital Human capital plays a pivotal role in endogenous growth models. Lucas (1988) introduced a model where human capital accumulation is a driving factor. The production function can be extended to:

$$Y = AK^{\alpha} HL^{1-\beta} \quad \text{3.2}$$

Where: h represents the average level of human capital,- other variables are as previously defined. Human capital, is assumed to grow based on educational investment and learning-by-doing, making it an internal component of the growth process.

Romer (1990), highlighted the importance of knowledge and innovation. Knowledge accumulation and technological advancements are treated as an outcome of intentional investment in research and development (R&D). Romer's production function can be expressed as:

$$Y = A(t)K^{\alpha} HL^{1-\beta} \quad \text{3.3}$$

With the technology term A(t) evolving according to: dot{A} = delta R. where: dot{A} is the rate of change in technology, - delta is a constant that measures the productivity of R&D, R represents the resources allocated to R&D activities. This equation signifies that technology grows proportionally with investments in R&D, representing a key mechanism for sustained economic growth within the system. The model stresses that policies and conditions that influence these internal factors can significantly impact economic growth rates. In this context, inflation and exchange rates are critical because they affect the stability and predictability necessary for fostering internal investments in education, research and development (R&D), and physical capital.

Furthermore, the effect of inflation rate and exchange rate has been explored empirically by different scholars. For instance a study by Damayanti and Darmawan (2024) analysed the relationship between the exchange rate, inflation, interest rates, and economic growth in Southeast Asia from 2007 to 2022. The analysis' variables included economic growth as a dependent variable and exchange rate, inflation rate, and interest rate as independent factors. The data was evaluated using path regression, and the findings show that inflation, exchange rates, and interest rates have a negative impact on economic growth in the ASEAN region. In the same year, Haider *et al.* (2024) explore the intricate relationship between inflation and GDP per capita in Pakistan over the period from 1964 to 2022, utilizing the ARDL methodology for their analysis. Their findings reveal that inflation has a positive impact on GDP per capita. However, the exchange rate is found to have an insignificant negative effect on economic growth.

Similarly Ezako (2023) explored the dynamics between inflation and economic growth in Burundi from 1990 to 2020 using autoregressive distributed lag (ARDL) methodologies. The bounds test outcomes indicated a long-term relationship between the variables. The results demonstrated a short-term negative and significant impact of inflation on economic growth, while in the long run, investment, household consumption, and exchange rates were found to have a positive and significant association with economic growth. Nonetheless, the study's primary limitation was the application of ARDL with a dependent variable that is integrated of order zero (I(0))

In the same year, Ezako (2023) research delves into the dynamics between inflation and economic growth in Burundi from 1990 to 2020, employing autoregressive distributed lag (ARDL) and bound testing techniques to analyze the data. The bounds test results confirmed a long-run relationship among the studied variables. In the short run, the ARDL results revealed a significant negative correlation between inflation and economic growth. Conversely, in the long run, the study found significant positive relationships between economic growth and factors such as investment, household consumption, and exchange rates. The study's primary limitation was its use of an ARDL model with a dependent variable that is integrated of order zero, I(0).

In the case of Nigeria Nyeche (2024) explored the impact of exchange rate fluctuations on economic growth from 1985 to 2021, using gross domestic product (GDP) as a proxy for economic growth. The analysis employed autoregressive distributed lag (ARDL) techniques to evaluate the relationship between GDP and independent variables such as the exchange rate, trade openness, and external reserves. The ARDL bound test results indicated a long-term relationship among these variables, demonstrating that exchange rates, trade openness, and external reserves have a significant positive effect on Nigeria's real GDP. However, the study's reliance on GDP as a proxy for economic growth is considered a limitation, as GDP per capita might serve as a more accurate measure. Further, the research omits crucial post-estimation diagnostics like tests for autocorrelation and heteroskedasticity, potentially affecting the robustness of its findings.

In the same vain, Ekpo (2023) conducted a comprehensive study to assess the influence of exchange rate volatility on Nigeria's economic growth, leveraging time series data spanning from 1970 to 2020. The analytical approach comprised the pair-wise Granger causality test, Johansen cointegration test, and multiple regression

analysis. The Johansen cointegration results indicated a long-term relationship among the variables. Additionally, multiple regression analysis disclosed that while exchange rate volatility adversely affects economic growth, the trade balance exerts an insignificant positive effect

Likewise, Ewubare and Ushie (2022) investigated the relationship between currency rates and economic growth in Nigeria from 1981 to 2020. Economic growth was used as a dependent variable in the analysis, with the exchange rate, inflation rate, and interest rate serving as independent factors. The data were analyzed using bounds cointegration tests and the ARDL model. The boundaries cointegration test revealed a long-run link between the variables. The findings also showed that exchange rate and inflation have significance impact on economic growth.

In the same manner, Okoro and Kenneth (2024) study the impact of inflation and stagflation on Nigeria's economic growth from 2012 to 2024. The study applies the autoregressive distributed lag on the selected variables, namely; real GDP, inflation rate, interest rate, exchange rate, degree of economic openness, money supply, and government consumption expenditures during the period. The study's findings show that inflation and stagflation have a considerable negative impact on economic growth, while the other factors in the model had insignificant effect on Nigeria's economic growth. However, inflation and openness have no direct link with GDP.

In a similar study conducted in Nigeria, Adaramola and Dada (2020) study the impact of inflation on economic growth from 1980 to 2018. The variables considered in the analysis include real GDP, inflation rate, interest rate, exchange rate, degree of economy openness, money supply, and government consumption spending. The data was evaluated using an autoregressive distributed lag model, and the results revealed that inflation and the real exchange rate have a large negative impact on economic growth, whereas interest rates and money supply have a positive and considerable impact.

Furthermore, it is clear that findings from the above studies have been inconclusive, presenting both positive and negative effects without reaching a consensus on the actual dynamics of this relationship. Studies by Damayanti and Darmawan (2024), Ezako (2023), Ewubare and Ushie (2022), Okoro and Kenneth (2024) and Adaramola and Dada (2020) found a negative relationship between inflation and economic growth while a study by Haider *et al.* (2024) found a positive relationship between inflation and economic growth. On the other hand, Ewubare and Ushie (2022), Damayanti and Darmawan (2024) & Adaramola and Dada (2020) found a negative relationship between exchange rate and economic growth while Ezako (2023) and Nyeche (2024) found a positive nexus between exchange rate and economic growth.

Despite the numerous studies being conducted, to the best of this study knowledge, a study on the interaction effect of inflation rate and interest rate on economic growth in Nigeria has not been found. Theoretically the impact of inflation rate on economic growth is mediated by the level of interest rates. Higher interest rates are generally a policy response to rising inflation. When inflation is falling and economic growth slowing, central banks may lower interest rates to stimulate the economy. Therefore, this study contributes to knowledge by also examining the interaction effect of inflation rate and interest rate on economic growth in Nigeria.

3. Methodology

3.1. Nature and Source of Data

The study used annual time series data for the analysis over the period 1995-2023. The study considered 1995 as it base year so as to cover the effect of Autonomous Foreign Exchange Market (AFEM) instituted by the Nigeria's military government, led by General Sani. The AFEM was reestablished, allowing private companies to source foreign exchange at the parallel market rate of 90 naira to the dollar in November 1995 (Babagana, 2023). Data on economic growth (proxy by GDP par capital growth rate), human capital development (proxy by primary school enrolment rate) and inflation rate were sourced from World Development Indicators of the World Bank (2023). Data on exchange rate and interest rate were sourced from Central Bank of Nigeria (2023).

Table-1. Variable, Measurements, Apriori Expectation and Source

Variables	**Measurement**	**Expected Sign**
	Dependent Variable	
Economic Growth (proxy by GDP par capital growth rate)	Percentage	
	Independent Variables	
consumer price index	Percentage	Negative
Exchange Rate	Par USD	Negative/Positive
Interest Rate	Percentage	Negative
Human Capital Development (proxy by primary school enrolment rate)	Percentage gross	Positive
Interaction Term=INT*INF		Positive

Source: Author's computation, (2024).

3.2. Model Specification

The model used for this was adapted from the work of Aladejare and Musa (2024) on simulating contemporaneous effects of inflation and exchange rates on economic prosperity path for Nigeria. They specified that economic growth (EG) is a function of inflation rate (INF), exchange rate (EXR), interest rate (INT) deficit financing (DF) and foreign direct investment (FDI) as follows:

EG=f(INF,EXR,INT, DF, FDI)……..…..3.4

Furthermore, for the purpose of this study, deficit financing and foreign direct investments were removed and replaced with human capital development as a control variable because it theoretical variables based on the endogenous growth model proposed by Romer (1986)

EG=f(INF, EXR, INT, HCD,)……..…...3.5

Where: INF=Inflation Rate, EXR=Exchange Rate, INT=Interest Rate, HCD=Human Capital Development (proxy by primary school enrolment rate)

The model can be written in econometrics form as follows:

$EG_t = \emptyset_0 + \emptyset_1 INF_t + \emptyset_2 EXR_t + \emptyset_3 INT_t + \emptyset_4 HCD_t + \varepsilon_t$……...……..….3.6

Where: $\emptyset_0 - \emptyset_4$ are the parameters to be estimated, ε = is the Error term, and t= time trend, others as stated in equation 3.4

Furthermore, the study introduced an interaction term into the model in equation 3.5 so as to capture interaction effect of inflation rate and interest rate on economic growth as follows:

$EG_t = \beta_0 + \beta_1 INF_t + \beta_2 EXR_t + \beta_3 INT_t + \beta_4 (INT_. * INF)_t + \beta_5 HCD_t + \varepsilon_t$…….3.7

Where: $\beta_0 - \beta_5$=Parameters to be estimated, INT*INF=Interaction Term (product of INT and INF), others as stated in equation 3.4

3.3. Technique of Data Analysis

First, the study would carry out unit root test using the Augmented Dickey Fuller method so as to assess the stationarity level of the variables in order to avoid a spurious regression result. Thereafter, cointegration test would also be carry out using the bounds test method and the parameters of the model would be estimated using the Autoregressive Distributed Lag (ARDL) model since it accommodate variables that have both the combination of I(1) and I(0) (Peseran *et al.*, 2001).

4. Results and Discussion

4.1. Descriptive Statistics of the Variables

The study provides descriptive statistics on the variables for mean, standard deviation, minimum value, maximum value, skewness, kurtosis and Jarque Bera and presented the results in Table 2.

Table-2. Descriptive Statistics of the Variables

	EC	INF	EXR	INT	INF*INT	HCD
Mean	356646.60	15.40	185.89	17.28	272.93	89.59
Median	277539.20	12.54	148.88	17.59	181.73	89.28
Maximum	931233.20	72.84	633.83	24.77	1261.51	100.19
Minimum	28656.10	5.39	21.88	11.00	91.27	76.46
Std. Dev.	289650.20	12.43	139.17	3.66	231.71	6.71
Skewness	0.54	3.60	1.39	0.07	2.91	0.05
Kurtosis	2.07	17.05	4.97	2.12	12.59	1.94
Observations	29	29	29	29	29	29

Source: Author's Computation, (2024) using EVIEWS 9. Where: EC=Economic Growth (proxy by GDP par capital), INF=Inflation Rate, EXR=Exchange Rate, INT=Interest Rate, HCD=Human Capital Development (proxy by primary school enrolment rate), INF*INT=Interaction Term.

The mean value of economic growth (EC), proxied by GDP per capita, stands at 356,646.60. This indicates a relatively high average economic output per person. However, the median (277,539.20) suggests that half the observations lie below this value, pointing to potential disparities in economic performance. The positive skewness (0.54) and moderate kurtosis (2.07) suggest that while there are sporadic high values causing the skew, the data distribution is not excessively peaked.

Inflation rate exhibits a mean of 15.40, with the median at 12.54. The higher value of the mean compared to the median implies the presence of some extremely high inflation rates, corroborated by the maximum value of 72.84. The high skewness (3.60) and kurtosis (17.05) values reflect a data distribution with extreme outliers and a heavy-tailed nature. This can attribute to specific periods of high inflation within the dataset. Findings also showed that exchange rate has a mean value of 185.89 and a median of 148.88, again indicating the presence of high outliers and substantial volatility, as evidenced by the standard deviation of 139.17. The maximum value of 633.83 demonstrates periods of severe currency depreciation. Skewness (1.39) and kurtosis (4.97) suggest strong asymmetry and a heavy-tailed distribution, respectively, implying that the exchange rate has experienced some extreme deviations.

Furthermore, interest rate displays more stability with a mean of 17.28 and a median of 17.59. The minimal difference between these values suggests a relatively symmetric distribution, confirmed by the low skewness (0.07). The kurtosis value (2.12) indicates that the distribution is close to normal but with slightly more extreme values. The interaction term, which is the product of inflation rate and interest rate (INF*INT), averages at 272.93. The median (181.73) and maximum (1261.51) values indicate considerable dispersion, supported by a high standard deviation (231.71). This is further confirmed by the skewness (2.91) and kurtosis (12.59), implying that the interaction term data is heavily skewed to the right and features significant outliers. Additionally, human capital development (HCD), proxied by the primary school enrollment rate, shows a mean of 89.59 and a median of 89.28, suggesting data symmetry. The standard deviation of 6.71 indicates stability in the enrollment rates. A minimal skewness (0.05) and kurtosis (1.94) point to a nearly normal distribution.

4.2. Unit Root Test

The Augmented Dickey-Fuller (ADF) methods was used for the unit root test of the variables, with the results shown in Table 3.

Table-3. Summary of Unit Root Test results at Trend and Intercept

Variables	Test Statistics at Level	5% Critical Value at Level	Test Statistics at First Difference	5% Critical Value at First Difference	Order of Integration
logEC	-0.156386	-3.580623	-4.532827	-3.587527	I(1)
logINF	-4.342650	-3.580623	-3.710079	-3.632896	I(0)
logEXR	-2.262073	-3.580623	-5.026608	-3.587527	I(1)
logINT	-1.531921	-3.580623	-5.338326	-3.587527	I(1)
logINF*INT	-2.974591	-3.580623	-4.703221	-3.587527	I(1)
logHCD	-3.008282	-3.580623	-5.286716	-3.587527	I(1)

Source: Author's Computation, (2024) using EVIEWS 9. Where: EC=Economic Growth (proxy by GDP par capital), INF=Inflation Rate, EXR=Exchange Rate, INT=Interest Rate, HCD=Human Capital Development (proxy by primary school enrolment rate), INF*INT=Interaction Term.

The Augmented Dickey-Fuller Unit Root Test presented in Table 4 revealed that economic growth, exchange rate, interest rate, human capital development and interaction term are not stationary at level because their test statistic values are lower than their 5% critical values at level in absolute terms. However, the variables became stationary at first difference because their test statistics at first difference are greater than their 5 percent critical values at first difference in absolute terms. On the other hand inflation rate became stationary at level because its Test Statistics at level is more than its 5 percent Critical Values at level in absolute terms. Based on the results, the study concluded that the variables considered for the analysis are have the combination of integrated of order one and zero I(1) (0).

4.3. ARDL Bounds Test to Cointegration

The study uses the ARDL Bounds test to cointegration approach for the analysis since it can handle variables that are all integrated of order one and zero. The result of the ARDL Bounds test to cointegration is shown in Table 4.

Table-4. *ARDL Bounds Test to Cointegration*

Computed F- Statistic	K	5% critical Bound Test value	
		Lower Bound	Upper Bound
9.380974	5	2.62	3.79

Source: Author's Computation, (2024) using Eviews 9.

From the result, the F- statistic value of 9.380974 is higher than both the lower and upper bound critical values at 5 percent level of significance. Since the computed F-Statistic exceeds both the lower and upper bounds, we can reject the null hypothesis of no cointegration and conclude that there is a cointegration relationship between the variables in the model. This suggests that the variables move together in the long run

4.4. ARDL Short Run and Long Run Estimate

The study utilized automatic lag selection and Akaike Information Criterion (AIC) to determine the appropriate number of lags for the ARDL model, resulting in a lag structure ofARDL (2, 1, 1, 1, 1, 0). Certain variables were transformed into logarithmic form in order to improve the normality of data distributions and mitigate the impact of outliers. The findings of the short run and long run ARDL estimate are presented in Table 5.

Table-5. *ARDL Short Run and Long Run Estimate*

Short Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Δ(logEC(-1))	-0.406855	0.179000	-2.272936	0.0382**
Δ(INF)	-0.004395	0.002081	-2.111256	0.0440**
Δ(logEXR)	-0.023529	0.044904	-0.523980	0.6079
Δ(INT)	-0.002390	0.003117	-0.766747	0.4551
Δ(logINF*INT)	0.016464	0.039181	0.420214	0.6803
Δ(logHCD)	-0.245881	0.146772	-1.675255	0.1146
ECT(-1)	-0.136052	0.031073	-4.378453	0.0005*
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.085575	0.039006	-2.193905	0.0444*
logEXR	1.174762	0.151546	7.751841	0.0000**
INT	-0.046608	0.023300	-2.000319	0.0639
logINF_INT	0.818710	0.373622	2.191276	0.0446**

logHCD	-1.807252	1.122256	-1.610374	0.1282
C	-0.727588	2.380597	-0.305633	0.7641

Source: Author's Computation, (2024) using EVIEWS 9. Where: Δ=Difference, log= logarithms, EC=Economic Growth (proxy by GDP par capital), INF=Inflation Rate, EXR=Exchange Rate, INT=Interest Rate, HCD=Human Capital Development (proxy by primary school enrolment rate), INF*INT=Interaction Term, * & ** indicate 1%, 5% significance levels, respectively.

Table-6. Diagnostic Test

Test	Statistic	P-Values
R Square	0.968981	
F Statistics	1337.428	0.0000
Jarque-Bera Sta.	0.321113	0.851670
Breusch-Godfrey Serial Correlation LM	0.657661	0.7198
Heteroskedasticity :Breusch-Pagan-Godfrey	0.657661	0.7198

Source: Author's Computation, (2024) using EVIEWS 9

The diagnostic tests summarized in Table 5 reveal a robust and reliable regression model. The R-squared value of 0.968981 indicates that approximately 97% of the variability in the dependent variable is explained by the independent variables, signifying an excellent fit. The F-statistic of 1337.428 with a p-value of 0.0000 confirms the overall significance of the regression model, rejecting the null hypothesis that all regression coefficients are equal to zero. The Jarque-Bera statistic of 0.321113 with a p-value of 0.851670 suggests that the residuals are normally distributed. Moreover, both the Breusch-Godfrey Serial Correlation LM test and the Breusch-Pagan-Godfrey test for heteroscedasticity return p-values of 0.7198, demonstrating no evidence of serial correlation or heteroscedasticity, respectively. Therefore, the interpretations and discussions of the results are as follows:

The results of the short run estimate revealed that the coefficient of the error correction term (ECT) is negative and significance (-0.136052). The negative significance of the error correction term demonstrates that a long-run equilibrium relationship exists among the variables such as economic growth, inflation rate, exchange rate, interest rate, human capital development and interaction term, suggesting that deviations from this equilibrium are not permanent but are corrected over time and any deviation from the long-run equilibrium is corrected by 13.6% per period

The results showed that in the short run a 1% increase in the inflation rate will result in a 0.004395% significance decrease in economic growth at 5% level. Likewise the long run estimate revealed that a 1% increase in inflation rate results in an0.085575% significance decrease in economic growth at 5% level. The results also showed that in the short run a 1% increase in the exchange rate will bring about a 0.023529% insignificance decrease in economic growth. In contrast, the long run estimate showed that a 1% increase in the exchange rate would result in a 1.174762% significance increase in economic growth

Furthermore, the results also indicated that a 1% increase in interest rates would lead to a 0.002390% insignificance decrease in economic growth in the short run, but this relationship is not statistically significant. Similarly, the long run estimate showed that a 1% increase in interest rates would lead to a 0.046608% insignificance decrease in economic growth. The results also revealed that a 1% increase in human capital development leads to a 0.245881% insignificance reduction in economic growth. In the same manner, the long run showed that that a 1% increase in human capital development leads to a 1.807252 % insignificance decrease in economic growth. One possible reason is that the quality of education and training received by individuals in Nigeria is not sufficient to enhance their productivity and contribute to economic growth due to poor funding by the government. Additionally, the coefficient for the interaction term (INF*INT) in the long is positive (0.818710) and significance with a probability of 0.0446, showing that the combined effect of inflation and interest rate on growth is positive and significant. However, in the short run the combine effect of interest rate and inflation rate is positive but insignificance

5. Discussion of Results

It is theoretically expected that an increase in inflation should lead to a fall in economic growth. The results of this study supported this assertion because it shows that inflation rate has significance negative impact on economic growth in Nigeria both in the short run and long. This finding is consistence with empirical studies conducted by Damayanti and Darmawan (2024), Ezako (2023), Ewubare and Ushie (2022), Okoro and Kenneth (2024), Adaramola and Dada (2020) but in contrast with the findings of Haider *et al.* (2024) who found that inflation has a positive effect on economic growth.

From theoretical point of view, depreciation in the exchange rate makes a country's exports cheaper for foreign buyers, while imports become more expensive for domestic consumers. This can lead to an increase in export competitiveness and a decrease in imports, which in turn can boost economic growth through increased export revenues and decreased trade deficits. On the other hand, an appreciation in the exchange rate can have the opposite effect, making exports more expensive and imports cheaper, which can hinder economic growth. However, the short-run results presented in Table 5 have failed to support this theoretical assertion in the case of Nigeria. The findings revealed that an increase in the exchange rate actually had a negative impact on economic growth in Nigeria. One possible explanation for this unexpected result could be that Nigeria's economy is heavily dependent on imported goods and services, and an increase in the exchange rate may have led to higher costs for imports, negatively impacting domestic consumers and businesses. This finding is consistent with the findings of Damayanti and Darmawan (2024), Haider *et al.* (2024), Nwikina and Ekere (2024), Ewubare and Ushie (2022) and Adaramola

and Dada (2020). On the other hand the long run estimated showed that increase in exchange rate has positive impact on economic growth in Nigeria which is in line with the theoretical expectation and findings of Ezako (2023) and Nyeche (2024).

Theoretically, an increase in interest rates is expected to reduce the inflation rate, subsequently fostering economic growth. This theoretical premise is supported by the this study where the coefficient of the integration term—representing the combined effect of inflation and interest rates show a significantly positive sign, indicating that the interaction between inflation and interest rates has a beneficial impact on economic growth. This finding implied that that under specific conditions, the adverse effects of inflation can be mitigated by strategically adjusting interest rates, thus promoting economic development.

6. Conclusion

This study focused on the effect of inflation rate and exchange rate on economic growth in Nigeria over the period 1992 to 2023. In light of the results, the study concluded that inflation and exchange rates exert a detrimental influence on Nigeria's economic growth. On the other hand, the interaction effect of inflation and interest rates contribute significantly to economic growth. This intriguing dynamic suggests that while either variable alone hampers growth, their interation can create a stabilizing force that mitigates the negative aspects and fosters a more conducive environment for economic growth.

Recommendations

The following recommendations were provided based on the findings:

i. Since inflation rate showed negative effect on economic growth both in the short run and long run, it is imperative for the Nigerian government to address supply-side constraints by investing in infrastructure, boosting agricultural productivity, and enhancing the manufacturing sector. This would help reduce the cost of production and stabilize prices, thereby curbing inflation from both demand and supply sides.

ii. Since exchange rate showed a negative effect on economic growth in the short run, it is important that Nigerian government should prioritize stabilizing the exchange rate by diversifying its economy away from excessive reliance on oil exports. By boosting non-oil sectors such as agriculture, manufacturing, and technology, Nigeria can enhance its export base, attract foreign direct investment, and build a resilient economy that is less susceptible to exchange rate fluctuations.

iii. Since the interaction or the join effect of inflation and interest rate showed a significance positive effect on economic growth both in the short run, it is essential for Nigeria government to adopting a flexible interest rate policy that responds adeptly to inflationary trends. By adjusting interest rates in response to inflationary pressures, the central bank can stabilize the purchasing power of the currency, thereby maintaining consumer and investor confidence and promote growth.

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