# EFFECT OF CONSUMER PRICE INDEX ON NIGERIA'S ECONOMIC GROWTH USING AUTOREGRESSIVE DISTRIBUTED LAG MODEL APPROACH

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**ABSTRACT**
This study examined the effect of the consumer price index on Nigeria's economic growth. All variables in the model were allowed to be endogenous using the Autoregressive distributed lag Model (ARDL). The study used Secondary data from 1983 to 2023. The study uses the autoregressive distributed lag Model and an Error correction mechanism on some selected relevant variables, which include Gross domestic product (GDP), Inflation rate, Interest rate, Exchange rate, degree of economic openness, money supply, and government consumption expenditures for the years 1983–2023 to investigate the effect of CPI on the growth prospects of the Nigerian economy. According to the results of other researchers who conducted comparable studies, the money supply and interest rate significantly influence economic growth. In contrast, the real exchange rate and inflation have a significant negative impact. The model's other variables show little impact on Nigeria's economic growth. The causation result demonstrates the one-way links between the gross domestic product, government consumption expenditures, interest rates, and exchange rates. However, there is no correlation between the degree of openness and Inflation and the GDP. As a result, the study concludes that to prevent inflation's adverse effects and ensure a practicable rate that would support Nigeria's economic growth, the monetary authorities should make a more concerted effort to tackle high inflation in the economy.

**Keywords:** Consumer Price Index, Gross Domestic Product, Economic growth, Autoregressive distributed lag (ARDL), and Error correction Mechanism

## 1. INTRODUCTION

Relative pricing stability for products and services inside the country is one of the primary duties entrusted to monetary bodies. This emphasis is based on the idea that monetary policy enhances the value of money, reduces inflation and the uncertainties accompanying it, and improves the nation's prospects for sustained growth and development. Accordingly, one of the most important objectives of a nation's monetary authorities continues to be preserving relative stability (Anidiobu, Okolie, & Oleka, 2018).

Every economic actor, including human and material resources, in an economy engaged in economic activities, works to create goods and services that will result in a productive value that raises incomes for all levels of government, businesses, households, and even individuals. Therefore, the income earned is the value of all goods and services produced by all economic actors represented by the GDP. Therefore, GDP calculates the total value of products and services

generated in a nation over a given period. Usually quarterly or yearly. Although GDP is constantly criticized for failing to account for human welfare and is presumed to ignore externalities, GDP is a valuable economic instrument for identifying periods of economic expansion and contraction. The National Bureau of Statistics and Monetary authorities representing the Central Bank of Nigeria (CBN) support that an economy is in recession whenever GDP declines in two consecutive quarters. An average change in prices that people pay for products and services rendered over time is measured by the Consumer Price Index (CPI). The most well-known measure of Inflation is CPI. A declining CPI indicates lower inflation, while a higher CPI indicates high inflation.

The consumer price index is a reliable and widely used indicator of inflation and one of the most important metrics for assessing the effectiveness of a nation's monetary policies.The Consumer Price Index (CPI) tracks shifts in the average price of household purchases of consumer goods and services across time. One commonly used measure of how consumers are affected by inflation is the CPI's annual rate of change. Thus, to project future CPI, economic policymakers greatly value any model that closely matches the behavior of the CPI.

The CBN characterizes its policy decisions as discretionary due to various factors considered in multiple meetings of the Monetary Policy Committee (Ayinde, Bankole, and Adeniyi, 2020); it remains economically and econometrically accurate to utilize GDP in assessing and projecting Nigeria's economic growth. Various Researchers have delved into this topic and can understand and deduce that in forecasting critical economic growth and development, GDP is not just a want but an essential factor to consider, especially as Nigeria's economy is biting harder and still trying hard to come out of recession to growth. To foresee a course of action for the future, it is reasonably necessary to consider important macroeconomic indicators like the GDP needed to adapt policies successfully. These adjustments should favor other macroeconomic variables like inflation, job creation, exchange rates, etc. Forecasts mainly assist decision-makers and legislators who require data to establish the best policies. Companies estimate future sales to change their production, and Monetary Authorities need key knowledge about the future inflation path to modify its interest rate. Without any doubt, forecasting serves a very significant function in formulating public policy. However, it has not gained much attention, but in recent times, some Researchers have gained specific interest in forecasting GDP.

## 2. STATEMENT OF THE PROBLEM:

Presently, Nigeria is facing a terrible recession and highInflation. Monetary authorities in Nigeria make confident decisions based on price and output development. Making decisions about the monetary policy rate without estimating the output gap is equivalent to making costly errors and uncertain revisions that will crash the economy. Several benefits can be derived from making accurate forecasts, which are not limited to making t Peo Mkhatshwa et al. (2015) examine the effects of Swaziland's inflation rate on agricultural and economic growth from 1980 to 2013. According to the autoregressive distributed lag (ARDL) analysis results, Swaziland's growth is positively correlated with agricultural growth and negatively correlated withInflation. The results of the causality test indicate a unidirectional association between the inflation rate and economic

growth, but no causal relationship was discovered between any other variables. Mamo (2012) studied the impact ofInflation on economic growth in 13 countries in Sub-Saharan Africa (SSA) between 1969 and 2009. ple are therefore compelled to save, which allows the government to raise funds for development (Doguwa, 2013; Enejoh & Tsauni, 2017; Mankiw, 2010). Price increases encourage workers to shift structurally from the traditional subsistence sector to the more expansive industrialized sector, creating space for more optimal and full utilization of economic resources and positively contributing timely, effective, and efficient policies toward economic growth and development. It is disturbing that the Nigerian economy has been fluctuating and plunging into an economic recession from 2015 to date. The logical question is, is there any macroeconomic forecast at all? Some scholars in this field have attributed the economic downturn to international oil prices, the decline in crude oil production, COVID-19, and the rise in the Dollar exchange rate. The acclaimed attributing factors indeed contributed to the economic recession; however, if at all economic tools were deployed so frequently to understand the dynamics of the Nigerian economy and relevant forecasts were made, such doom would have been anticipated, and appropriate policies would have been put in place. In their research,

In line with the statement of the problem, the research's main objective is to analyze and forecast the effect of CPI on Nigeria's economic growth, while the specific objectives of the study are to analyze the short-run effect of CPI on Nigeria's economic growth (GDP), to forecast the long-run effect of CPI Nigeria's economic growth (GDP), and to examine among the independent variables used, that is positively or negatively related to GDP in the Nigerian economy. Another possibility is structuralInflation, which results from adjustments to monetary policy. The term "built-in inflation" is typically used to describe this kind ofInflation. Inflation can fall into one of these categories: hyper, extremely high, chronic, high, moderate, or low (Umaru & Zubairu, 2012). Forecasts of a wide range of economic variables are provided by the central banks of many nations and other international entities; nevertheless, little theoretical research is done on model selection, accuracy, or other issues about GDP forecasting (Pilström and Pohl, 2009). It is crucial to continue pursuing economic diversification in a nation like Nigeria, where efforts to diversify the economy are still in its infancy and oil remains a major source of GDP. Studies that attempt to understand and forecast Nigeria's GDP level are critical. Nyoni (2019) used ARIMA models to forecast the Australian CPI, following the Box and Jenkins technique. The outcome showed that ARIMA (1, 1, 0) might be used to anticipate the CPI in Australia. The study's findings indicated that Australia's CPI will probably keep rising in the next ten years.

Studies, therefore, in these areas seem to be inconclusive. The disparate outcomes from the empirical investigations prevent the Researchers from reaching a reliable conclusion about the topic. Even worse, some studies that looked at this topic were unable to draw firm conclusions about howInflation and economic growth are related (Anochiwa & Maduka, 2015; Dwnbel et al., 2016; Gatawa, Abdulgafar & Olamide, 2017; Inyiama, 2013; Oladipo & Akinbobola, 2011; Shuaib, Augustine, & Frank, 2015).

Idris and Suleiman (2019) examine the impact ofInflation on Nigeria's economic growth between 1980 and 2017 in a related study. The study uses a vector error correction mechanism on

the chosen variables, which include the nation's GDP, interest rate, inflation rate, and exchange rate. The findings reveal the long-term relationship between the variables, which also show that the interest rate and inflation rate significantly negatively impact Nigeria's economic growth.

This study used GDP as the dependent variable, and the independent variables used were inflation rate, exchange rate, and interest rate, with secondary data obtained from the National Bureau of Statistics and the Central Bank of Nigeria Statistical Bulletin from 1983-2023. Also, this study employs an autoregressive distributed lag (ARDL) model and Error Correction Mechanism, which will best explain the short-run and long-run relationship that exist between the variables used (Anidiobu et al., 2018; D. Chude & N. Chude, 2015; Phiri, 2010; Umaru & Zubairu, 2012). ARDL, a dynamic specification model, uses the lags of both the dependent and independent variables. With this, the short- and long-run effects can be directly estimated.

## 3.  LITERATURE REVIEW

A rise in the cost of goods and services is known asInflation. When a price increase is consistent and exceeds a predetermined threshold, it is consideredInflation. For example, a rise in the money supply can eventually lead to increased prices. The literature has identified several forms of inflation, some of which include supply push, also known as cost-push inflation, which results from a reduction in supply brought on by an increase in the cost or price of the item produced. Demand-pull inflation results from an increase in aggregate demand without a commensurate increase in supply (Anochiwa & Maduka, 2015). Another possibility is structuralInflation, which results from adjustments to monetary policy. The term "built-in inflation" is typically used to describe this kind ofInflation. Inflation can fall into one of these categories: hyper, extremely high, chronic, high, moderate, or low (Umaru & Zubairu, 2012).

According to Anchiwa and Maduka (2015), the monetary authorities' ability to keepInflation in single digits would boost their power to speed up economic growth. For Nigeria, it's the other way around. The Central Bank of Nigeria Statistical Bulletin (2018) provides data on the inflation trend, which shows that the country's inflationary condition worsened alarmingly between 1980 and 2018. Nigeria has only seen single-digitInflation for fourteen of the previous thirty-eight years, according to the inflationary trend. Nonetheless, the ongoing rise in Nigeria's inflation rate proves that monetary and fiscal policies have failed. People are, therefore, compelled to save, which allows the government to raise funds for development (Doguwa, 2013; Enejoh & Tsauni, 2017; Mankiw, 2010). Price increases encourage workers to shift structurally from the traditional subsistence sector to the more expansive industrialized sector, creating space for more optimal and full utilization of economic resources and positively contributing.

The majority of research nevertheless shows thatInflation is harmful to economic activity, even despite the claim that some levels ofInflation promote economic growth (Kasidi & Mwakanemela, 2015; Manoel, 2010; Mkhatshwa, Tijani, & Masuku, 2015). They argue that it must be minimized to prevent inflation from exceeding a single digit. Mkhatshwa et al. (2015) examine the effects of Swaziland's inflation rate on agricultural and economic growth from 1980 to 2013. According to the autoregressive distributed lag (ARDL) analysis results, the causality test results

indicate a unidirectional association between inflation rate and economic growth, but no causal relationship was discovered between any other variables. Mamo (2012) studied the impact ofInflation on economic growth in 13 countries in Sub-Saharan Africa (SSA) between 1969 and 2009.

Ndoricimpa (2017) examined the impact of the inflation threshold on economic growth in a few chosen African nations using panel analysis. The outcome shows a nonlinear relationship between the two variables, and although it does not influence the sample as a whole, it is low-inflation. The outcome further demonstrates thatInflation above the cutoff has a detrimental impact on the economies of all the nations.

## 4. RESEARCH METHODOLOGY

This study examines the relationship betweenInflation and Nigeria's economic growth from 1980 to 2023. The current period represents the year in which annual data was found. In contrast, the base period represents when inflation became more noticeable in the nation due to rising oil prices and other variables directly impacted by the inflation rate. The study begins with a unit root test of the variable and uses autoregressive distributed lag (ARDL) and an Error Correction Mechanism. For this research, quarterly secondary data were obtained from CBN and the National Bureau of Statistics for 40 years, from 1983-2023.

### 4.1 Technique for Data Analysis and Model Specification:

This study used an Autoregressive Distributed lag Model and an Error Correction Mechanism as a data analysis technique. If the time series' underlying attribute is either 1(0) or 1(1) cointegrated, the ARDL Bounds testing approach is a potent statistical tool for estimating level relationships. The ECM is a theoretically based method that helps predict the long-run equilibrium in addition to the short-run coefficients and ensures that no valid coefficients are lost in the long run. The ARDL Model reduces the possibility of errors and random errors arising from non-stationary series data. Regression analysis frequently uses the ARDL Model, primarily concerned with the analysis testing probability aspect (Alkhuzaim 2004). This makes the ARDL model the best method to analyze data on INTR, INFR, EXGR, and GDP and their effect on the Nigerian economy. The ARDL model allows the independent variables to explain the dependent variable of its lag and the lag of other variables used.

### 4.2 Model Specification:

To investigate whetherInflation deters Nigeria's economic growth, the study adapts the models found in Idris and Suleiman's (2019) and Inyiama's (2013) publications. The study adopts one macro-economic variable, GDP, and three other variables: Interest rate values (INTR), Inflation rate values, and Exchange rate values. The model used for this investigation is constructed as follows:
The basic form of an ARDL regression model is written as:

$y_t = \alpha_0 + \alpha_1 x_t + \alpha_2 x_{t-1} + \alpha_3 y_{t-1} + \mu_t$

**Dependent variable:**

GDP

**Independent variables:**

Interest rate Values (INTV)

Inflation rate Values (INFV)

Exchange rate Values (EXGV)

The econometric model is given as:

GDP= f (INTV, INFV, EXGV)…(3.1**)**

The relationship that exists between the interests of variables can be represented in the model below:

$$GDP_t = \beta 0 + \beta_1 INTV_t + \beta_2 INFV_t + \beta_3 EXGV_t + \mu_t \ ... (3.2)$$

Where:

GDP = Gross Domestic Product

LIN TV = Log of Interest rate values

LINFV = Log of Inflation rate values

LEXGV = Log of Exchange rate values

$\beta_1$, $\beta_2$, $\beta_3$, $\beta_4$ and $\beta_5$ = Coefficients.

$\beta_0$ = Intercept.

$\mu t$ = Error Term.

The ARDL model of equation (3.2) is written as:

$$\Delta GDP_t = \beta 0 + \sum_{i=1}^{m} + \beta_1 \Delta GDP_{t-i} + \sum_{i=1}^{m} + \beta_2 \Delta INTV_{t-i} + \sum_{i=1}^{m} + \beta_3 \Delta INFV_{t-i}$$

$$+ \sum_{i=1}^{m} + \beta_4 \Delta EXGV_{t-i} + \alpha_1 GDP_{t-i} + \alpha_2 INTV_{t-i} + \alpha_3 INFV_{t-i} + \alpha_4 EXGV_{t-i} + \mu_t \ ... (3.3)$$

The ARDL model is divided into two representations. The first, which is $\beta_1$ to $\beta_6$, stands for the model's short-run dynamics, where $\beta_1$ stands for the dependent variable and $\beta_2$ to $\beta_6$ stands for independent variables. At the same time, the coefficients $\alpha_1$ to $\alpha_6$ represent a long-run relationship among the variables used. $H_0$ (null hypothesis) of the model used is written as $H_0$ $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = \alpha_5 = \alpha_6 = 0$, showing no cco-integration among variables used. To begin the estimation process, we must first perform a bound test for $H_0$ for the non-existence of a long-run relationship. The calculated F-statistics will be compared with the tabulated critical value. Suppose the F-statistics are higher than the tabulated critical value. In that case, the decision rule states that we should reject the $H_0$ of no existence of a long-run relationship, which indicates that co-integration does not exist, regardless of whether the underlying integration order of the variables is at I(0) or I(1). However, if the F-statistics lies below the lower critical value, it indicates that $H_0$ can be rejected. The outcome is considered inconclusive if it lies in the middle of the two tabulated critical values. The error correction model is estimated to get the short-run coefficients of the variables under study. The Error correction mechanism indicates the speed of adjustment to equilibrium whenever disequilibrium occurs in the Nigerian cashless economy.

The ARDL specification of the ECM model of equation (3.3) above can be written as:

$$\Delta GDP_t = \beta 0 + \sum_{i=1}^{m} + \beta_1 \Delta GDP_{t-i} + \sum_{i=1}^{m} + \beta_2 \Delta INTV_{t-i} + \sum_{i=1}^{m} + \beta_3 \Delta INFV_{t-i}$$

$$+ \sum_{i=1}^{m} + \beta_6 \Delta EXGV_{t-i} + \Delta ECM_{t-i}\mu_t \ \dots (3.4)$$

The Error correction equation is represented by the ECM, which measures and calculates the speed of adjustment to demonstrate how quickly a system returns to equilibrium.

## 4.3    Justification of Methods

The Autoregressive distributed lag model approach, which was developed, was used in this study to estimate equation (3.2); this approach was used because the model can be used whether or not the series of the study is stationary at I (0) or I(1) or even having both mixtures. This will help to give a robust result, though the sample size used is quite large. The Error Correction Model was also taken into consideration. The autoregressive distributed lag covers both the long-run connection and the short-run coefficients of the variables employed and error correction mechanism analysis. To prevent a spurious result, testing the unit root property of time series data is necessary. In this study, the stationarity status of the variables will be determined using the Augmented Dickey-Fuller stationarity tests. Once the stationary status of the variables under study has been confirmed, a co-integration test will be carried out using the ARDL bounds test approach. The normality of the residuals will be tested using the Jacque–Bera test. To determine whether there is a serial correlation among the variables, the Breusch-Godfrey (LM) serial correlation test will also be performed; if the analysis eventually shows that there isn't any, the model is sound. To determine whether our error term exhibits heteroscedasticity, we shall do the Breusch–Pagan Godfrey heteroscedasticity test. Finally, a multicollinearity test will be conducted to determine whether multicollinearity exists in the model that is being utilized. A CUSUM stability test will also be performed to see whether our model is stable.

## 5.  EXPECTED OUTCOME

The expected outcome will be derived from the outcomes of some researchers who had carried out similar research but with variations in the data used, as this research will use data from 1983 – 2023. Some expected outcomes from researchers who have done similar research work are cited below:

Olugbenga A. Adaramola and Oluwabunmi Dada (2020)"The impact of inflation on economic growth: evidence from Nigeria, using Autoregressive distributed lag Model, "with data spanning from 1990-2018. First, descriptive statistics ensure the variables are appropriately distributed—the trend analysis of Nigeria's inflation rate from 1980 to 2018. The Augmented Dickey-Fuller (ADF) unit root test was used to investigate the time series data attributes. The Autoregressive distributed lag (ARDL) bound test approach integration requires this as a prerequisite. The Granger causality test was then used to investigate the relationship's direction. Ultimately, diagnostic tests were run to validate the outcome using the cumulative sum (CUSUM) test, heteroscedasticity test, serial correlation test, and normality test. The study concluded that

while interest rates and money supply considerably benefit economic growth, real exchange rates and inflation have a significant negative impact. The model's other variables show little effect on Nigeria's economic growth. The causation conclusion demonstrates a one-way relationship between the gross domestic product, government consumption expenditures, interest rates, and exchange rates. Nonetheless, there is no direct connection between the gross domestic product and either level of openness or inflation. Therefore, the study suggests that the monetary authorities should make a more practical effort to aggressively manage inflation to avert its adverse effects by maintaining a reasonable rate that would encourage economic growth in Nigeria.

Sunday Timothy, Sunday Agbonjinmi, and Samuel Bewaji (2021)"The Impact of Consumer Price Index on Nigeria Economic Growth: via VAR approach (2010-202", All variables in the model were allowed to be endogenous variables by using the vector error correction model (VECM). The study's duration was from 2010 to 2018, and the VECM probability value showed a short-term correlation between the CPI and GDP, the dependent variable. Nonetheless, at a 5% significance level, C(2) with p/value = (0.3391) indicates that the GDP is not causally affected by the CPI over the Long Term. Additionally, the outcome of the second VECM probability value equation demonstrates a short-term link between GDP and the dependent variable, CPI. C(8), on the other hand, indicates that GDP does not have a long-term causal effect on GDP at the 5% significant level, with a p/value of (0.7303), In Nigeria. The study findings demonstrated the actual state of Nigeria's economy: rising consumer prices lead to higher aggregate output, which raises GDP without having a commensurately favorable impact on people's quality of life.

Consequently, the country's high unemployment rate and poverty make the positive correlation between GDP and CPI unjustifiable. i.e., the average Nigerian's life is not improved by the rise in GDP that follows a rise in the CPI. The Fisher Equation states that a rise in the money supply without a matching increase in the price of goods and services was consistent with the results.

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