

# Impact of Inflation on Economic Growth in Nigeria (1992-2022)

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## Abstract

*The paper examines the relationship between inflation and Economic growth in Nigeria from 1992 to 2022. Empirical evidence is obtained using annual data from the co-integration and error correction models. Evidence revealed a long-run negative relationship between inflation and Economic growth in Nigeria. Inflation is harmful rather than helpful for the growth of the nation. The policy implication is that to promote growth and keep inflation low, the government needs to control budget deficits. To check the growing challenges posed by inflation, there is a need to divert public expenditure from consumption to investment.*

**Key Words:** Inflation, Economic Growth, Investment, Public Expenditure

## Introduction

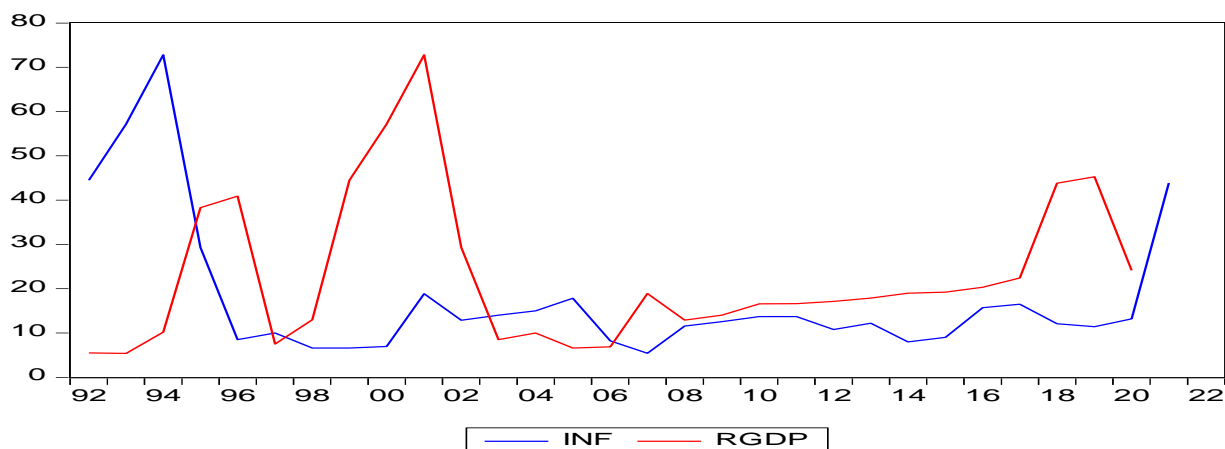
Most countries' target objective is to achieve sustainable economic growth. Many problems are being faced by them in order to achieve that objective of economic growth. Among the macroeconomic policies any nation can achieve are stable economic growth and a low inflation rate. Inflation is one of the variables as the determinant of economic growth (Barro, 1995). The relationship between inflation and economic growth is of different views. Different Researchers have worked on it and come up with different results. Theories and empirical findings have become a debate since both come with different outcomes in the relationship. To (Sidrauski, 1967), there may be no relationship (Fisher, 1993), negative relationship (Mallik and Chowdhury, 2001), there may be a negative or positive relationship between these two variables. The question to ask now is not only about the relationship but also about the level of inflation's effects on the economic growth in the country.

The investigator uses the following graph to understand better the relationship between inflation and economic growth in Nigeria.

## Data and Trend Analysis:

This study uses the annual GDP data and the inflation rate from 1992 to 2022. The data were obtained from the Central Bank of Nigeria (CBN) database. The chart below reflects the relationship between inflation and economic growth in Nigeria over the periods under consideration. The relative changes are presented below.

**Figure 1. GDP and inflation rate in Nigeria .**



**Author's Computation 2023 from World Bank Indicators 2022.**

It is possible to see a rough outlook of the relationship between inflation and economic growth from the graph. The graph shows that the relationship between inflation and economic growth might be positive or negative. From early 1992 to 1994, the real RGDP rise in Nigeria resulted from the Gulf War, which allowed the country to be among the major countries that exported crude oil in the world market in large quantities, and the country realized much revenue. It fell in 1998 and picked up till 2000 until it fell drastically in 2004 till 2006. It increased in 2007 and 2008 but fell drastically from 2009 due to global financial crises until 2016 and started to pick up gradually from 2017, 2018, and 2019 and fell continuously from 2020 to 2022. This resulted from mismanagement of resources and political leaders' wasteful spending of accumulated revenue. On inflation rate from the graph above, it reduced in 1992 till 1998. The fluctuations resulted from favourable monetary policy by the Central Bank of Nigeria (CBN) to regulate foreign exchange rates. It rose till 2002 and continued to fall in 2004, 2006 and then until 2022. The continuous rise in inflation in the country is a result of depending on foreign items by Nigerians, and unfavourable government policies in the country quickly lead to a continuous rise in the inflation rate in the country. The primary aim of this paper is to investigate the relationship between inflation and economic growth in Nigeria during the research periods and whether it will be negatively, positively or neither related.

## **Literature Review**

### **Theoretical Review**

The relationship between inflation and economic growth is linear; Mundell (1965) and Tobin (1965) suggest a positive relationship, while Stockman (1981) and Fischer (1983) support a negative relationship between them. In contrast, Fischer (1993) suggests that the relationship between inflation and growth is somewhat non-linear; the relationship is positive below a certain inflation threshold and negative above it. Some studies have attempted to explain nonlinearity in the relationship between inflation and economic growth. Using the “adverse selection mechanism” in the credit market, Choi et al. (1996) explain how inflation positively affects growth unless it exceeds some threshold level. Their idea is that in a financial market, there are borrowers and lenders where the financial system channels funds from lenders to borrowers. They argue that if inflation increases, the lenders are discouraged since the real rate of return on assets is reduced, which causes a reduction in the available funds for lending. At the same time, the rise in inflation encourages the borrowers, and there will be more people wanting to borrow, among them new borrowers who are just taking advantage of the situation and have higher default risk. This creates the problem of adverse selection for financial institutions called credit market rationing since banks will not provide credits for new borrowers with higher defaults. Hence fewer loans are given.

Consequently, an increase in inflation causes lower economic growth. However, when inflation is low, Choi et al. (1996) claim that an increase in inflation will not lead to an adverse selection mechanism, but instead, the Mundell-Tobin effect will take place. Thus, economic growth will be enhanced. In summary, the model of Choi et al. (1996) shows that low inflation levels promote growth, but high inflation levels harm economic growth because of credit rationing.

### **Empirical Review**

Several studies have examined the relationship between inflation and economic growth; some are country-specific studies (see, for instance, Fabayo and Ajilore, 2016; Ajide and Olukemi, 2018), while others are cross-country panel studies (see, for instance, Khan and Senhadji, 2013; Bick, 2016; Kremer et al., 2013; Ibarra and Trupkin, 2016). Among country-specific studies, Lee and Wong (2015) estimate an inflation threshold of 7.25% for Taiwan and 9.66% for Japan. Fabayo and Ajilore (2016) estimate an inflation threshold of 6% for Nigeria.

In contrast, Ajide and Olukemi (2018) find an inflation threshold of 9% for the same country Nigeria. Munir et al. (2019) estimate a threshold level of inflation at 3.89% for Malaysia.

Hasanov (2011) finds an inflation threshold of 13% for Azerbaijan. Phiri (2013) estimates an inflation threshold of 22.5% for Zambia. Tung and Thanh (2015) estimate an inflation threshold of 7% for Vietnam. All these studies conclude that inflation beyond the threshold is detrimental to growth. However, as Espinoza et al. (2019) point out, the relationship between inflation and growth is likely to be strong at low frequencies. Since available data points are usually few, panel data studies are better at capturing the inflation-growth relationship than country-specific studies.

**Methodology**

To achieve empirical results, this research adopted econometric models to investigate short-run and long-run relationships between real GDP and inflation. It applying the Engle-Granger (1987) co-integration procedure and the Error Correction Model (ECM).

**Model Specification:**

For this study, the basic model explaining the relationship between inflation and economic growth is specified as below.

$$\text{Log CPI}_t = a_1 + b_2 \text{ log R GDP}_t + \mu_1 \dots\dots\dots(1)$$

$$\text{Log RGDP}_t = a_1 + b_1 \text{ log CPI}_t + \mu_2 \dots\dots\dots(2)$$

where *Log RGDP* = log of real GDP,

*Log CPI* = log of CPI at time t, and  $\mu_1$  and  $\mu_2$  are random error terms (residuals). Residuals  $\mu_1$  and  $\mu_2$  measure the extent to which *Log RGDP* and *Log CPI* are out of equilibrium. If  $\mu_1$  and  $\mu_2$  are integrated of order zero, I (0), then it can be said that both *Log RGDP* and *Log t CPI* are co integrated and not expected to remain apart in the long run.

To determine the non-stationary property of each variable, the paper test each of the series in the levels (log of real GDP and log of CPI) and in the first difference (growth and inflation rate).

The DF test is based on the following model:

$$\Delta X_t = \varphi + \varphi_1 + \varphi_1 t + (p-1)X_{t-1} + e_1 \dots\dots\dots 3$$

The ADF test is a modification over the DF test and lagged values of the dependent variables are added in the estimation of equation (3) which is formed as follows:

$$\Delta X_t = \varphi + \varphi_1 T + \varphi_1 t + (p-1)X_{t-1} + \varphi_2 \Delta X_{t-1} + e_2 \dots\dots\dots 4$$

The PP test for unit root has been used in the empirical analysis. Therefore, the PP test provides robust estimates over the DF and ADF tests and is based on the following form of equation:

$$\Delta X_t = \varphi + \varphi_2(t-T/2) + (p-1)X_{t-1} + \varphi_3 \Delta X_{t-1} + e_3 \dots\dots\dots 5$$

All tests are carried out for both variables by replacing  $X_t$  with and in equations (3) (for the DF test), (4) (for the ADF test), (5) (for the PP test), (6) (for ECM test) Finally, the DF, ADF and PP unit root tests have been employed for residuals of equations (1) and (2),

Error Correction Model (i.e., ECM) is used in the following form:

$$\Delta \text{Log CPI} = \varphi_1 + \Sigma \varphi_2 \text{Lag}_1 \Delta \text{Log RGDP} + \Sigma \varphi_3 \text{Lag}_1 \Delta \text{Log CPI} - \varphi_4 \mu_{C,t-1} - e_2 \quad (6)$$

$$\Delta \text{Log RGDP} = \varphi_{11} + \Sigma \varphi_{22} \text{Lag}_1 \Delta \text{Log CPI} + \Sigma \varphi_{33} \text{Lag}_1 \Delta \text{LoRGDP} - \varphi_5 \text{Ec}_{,t-1} - e_2 \quad (7)$$

## Empirical Results and Discussion

The empirical analysis of this study is based on the estimation tests carried out for both variables by replacing  $X_t$  with and in equations (3) (for the DF test), (4) (for the ADF test), (5) (for the PP test), (6) (for ECM test) Finally, the DF, ADF and PP unit root tests have been employed for residuals of equations (1) and (2),

**Table 1: Unit Root test Result**

ADF and PP Decision		DF		ADF			PP	
No trend		With trend	No trend	With trend	No trend		With trend	No trend
I(0)	-9.58 ** I(0)	-1.78 I(1)	-4.31 ** I(0)	-4.60 ** I(0)	-4.31 ** I(0)	-5.12 ** I(0)	-0.300 I(1)	
I(0)	-9.47 ** I(0)	-5.54** I(0)	-9.47 ** I(0)	-8.97 ** I(0)	- 11.79* I(0)	- 10.39*** I(0)	-0.024 I(1)	
I(1)	-9.52 ** I(0)	1.78* I(1)	-0.013 I(1)	-1.74 * I(1)	1.69* I(1)	1.65 I(0)	0.47 I(1)	
I(0)	-5.34 ** I(0)	5.37 ** I(0)	-5.34 ** I(0)	-5.09 ** I(0)	-5.21 ** I(0)	-5.07 ** I(0)	0.084 I(1)	

Author's Computations 2023 from E-View.

**Table 2 : Estimation of the Log Real GDP Model (1) Using OLSM**

Table 2: Estimation of the Log Real GDP Model (1) Using OLSM Variable	Coefficient	SE	t-statistic	value- $\rho$
Constant	6.08	0.90	6.73	0.000
LogCPI	-0.015	0.13	-0.011	0.111
Time	0.091	0.018	5.16	0.000
<p>Mean dependent variable 6.97 S.E. of Regression 0.49            S.D. dependent variable 0.73 D.W. Statistic 0.48 AIC 1.55 Schwarz Criterion 1.70            F-statistics 13.30 Sum Squared Residual 4.36            Prob. (F-statistics) 0.000 R-Squared 0.60            Adjusted R-Squared 0.45</p>				

Author's Computations 2023 from E-View

**Table 3: Estimation of the LogCPI Model**

<b>Estimation of the LogCPI Model (2) Using OLSM Variable</b>	<b>Coefficient</b>	<b>SE</b>	<b>t-statistic</b>	<b>value-ρ</b>
<b>Constant</b>	6.77	0.14	2.72	0.014
<b>LogCPI</b>	<b>-0.047</b>	<b>0.049</b>	<b>0.199</b>	<b>0.84</b>
<b>Time</b>	0.0097	0.0026	3.23	0.047
<i>Mean dependent variable 6.56 S.E. of Regression 0.86            S.D. dependent variable 0.82 D.W. Statistic 0.48 AIC 1.55 Schwarz Criterion 2.82            F-statistics 0.022, Sum Squared Residual 13.31            Prob. (F-statistics) 0.98, Log-likelihood -25.0 R-Squared 0.0024            Adjusted R-Squared -0.11</i>				

The estimated results of the relationship between  $\Delta$  Log RGDP and  $\Delta$  Log CPI have been reported in Tables 2 and 3. The table shows a long-run and strong inverse relationship between CPI and real GDP in Nigeria, which implies a long-run *negative* relationship between inflation and economic growth. The coefficients are statistically insignificant and negative for regressions (1) and (2). Furthermore, Tables 3 and 4 illustrate that, on average, a 1-per cent increase in CPI in Nigeria leads to a decline in real GDP by 0.015 per cent. On the other hand, on average, a 1-per cent increase in the real GDP leads to a decline in the CPI rate by 0.047 per cent. The tables show linear causation between CPI and real GDP in Nigeria. The estimated coefficients are negative but statistically insignificant, implying that both CPI and real GDP affect each other negatively, inflation harms economic growth, and economic growth helps reduce inflation in the country.

**Table 4 : Unit Root Tests for the Residuals of (1) and (2) Error.**

Error	DF With Trend	ADF With Trend	PP With Trend	Decision
1ε	4.84***-	-4.57***	5.05***	I(0)
(Differene)	I(0)	I(0)	I(0)	
2ε	-9.51***	8.97***	-10.35***	I(0)
(Difference)	I(0)	I(0)	I(0)	

Author's Computations 2023.From E-View

Table 4 shows the DF, ADF, PP, and unit root tests for residuals of equations (1) and (2), i.e.,  $1\epsilon$  and  $2\epsilon$ . The results suggest that the residuals are integrated of order zero,  $I(0)$ . Therefore, it can be concluded that the two series,  $\Delta\text{LRGDP}$  and  $\Delta\text{LCPI}$  are co-integrated and thus a valid and stable long-run relationship exists between them, therefore, a stable long-run relationship between inflation and economic growth exists.

**Table 5: Johansen Test for Co-integration  $\Delta\text{LogRGDP}$  and  $\Delta\text{LogCPI}$**

Hypothesis	Test Statistics	5-percent Critical Value	1-percent Critical Value
<b>Maximum Eigen value Test</b>			
18.52 6.63	<b>14.26</b> <b>7.58</b>	<b>14.84</b> <b>7.58</b>	None At least 1**
<b>Trace Test</b>			
19.94 6.63	15.49 3.845	22.41 7.58	None* At least 1**

**Author's Computations 2023 from E-view**

Moreover, the results for Johansen maximum likelihood test reported in Table 5, confirm the rejection of the null hypothesis of no co-integration between  $\Delta\text{LogRGDP}$  and  $\Delta\text{LogCPI}$ . In particular, the computed trace, the maximum eigen value statistics and their corresponding critical values indicate that the null hypothesis of no co-integration ( $r = 0$ ) can be rejected under both of these tests at both 5-percent and 1-percent levels of significance. Both maximum Eigen value and trace tests indicate one co-integrating equation at both 5-percent and 1-percent levels of significance. This again implies a long-run relationship between inflation and economic growth in Nigeria.

**Table 6: The Error Correction Model (6) and (7)**

Variables Equation	$\Delta \log \text{CPI}$	$\Delta \text{LogRGDP}$
<b>Constant</b>	<b>0.089(0.32)</b>	<b>0.072(0.11)</b>
<b>ECt-1</b>	<b>-0.35(-1.09)</b>	<b>-0.56(-2.30)*</b>
LAG1 $\Delta \text{LogRGDP}$	-0.50(0.60)	-0.17(0.67)
$\Delta \text{LogCPI}$	-	- 1.115(1.33)
LAG1 $\Delta \text{LogCPI}$	-0.91(-3.11)**	0.57(0.62)
$\Delta \text{LogRGDP}$	-0.39(-0.49)	-
Adjusted R <sup>2</sup>	0.35	0.13
D.W.Statistics	1.95	<b>2.12</b>
Serial Correlation	0.119	<b>0.27</b>
Ramsey Test	6.212	<b>5.95</b>
Normality	58.13	<b>35.76</b>
Heteroscedasticity	3.78	<b>1.39</b>

**Author's Computations 2023 from E-View**

The empirical results show that, there is existence of short-run and long-run relationships between CPI and RGDP in Nigeria and are negatively related.

**Conclusion and Policy Recommendation**

This study is carried out specifically to investigate the effect of inflation on economic growth in Nigeria. Data spanning from 1990 to 2022, preliminary econometric tests were carried out, among which are unit root tests, to know the statistical properties or behaviour of our data and avoid spurious results regression that leads to imprecise estimation.

The main result revealed that inflation and economic growth are negatively related in the short run or in the long run. This is in line with the position of Fabayo (2016) on inflation and economic growth in Nigeria. From the outcome also, the sensitivity of inflation to changes in growth rates is more significant than that of growth to changes in inflation rates. These findings have important policy implications.

**Recommendations**

From these findings, the following policy recommendations are proposed.



Macroeconomic stability and the necessary infrastructure are among the preconditions for sustained growth. Among the ways inflation can affect growth, an important avenue is the effect of inflation on investment. Low or moderate inflation indicates macroeconomic stability and creates an environment conducive to investment.

The government needs to control budget deficits to promote growth and keep inflation low. While simulations indicate that this can be achieved by switching public expenditure from consumption to investment, this may take much work. The model allows the policymaker to see the various trade-offs involved. The overall message is clear—the government should curtail unproductive expenditure, which is terrible for growth and inflation, in favour of investment. Providing stability and the necessary infrastructure can set the stage for using other, more direct policy measures to promote growth.

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