

# Unemployment and Economic Growth: Testing the Validity of Okun's Law in Nigeria

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## ABSTRACT

This study explores the dynamic relationship between unemployment and Gross Domestic Product (GDP) growth in the context of the Nigerian economy from 1991 to 2021. Guided by Okun's Law, which posits a negative correlation between these two variables, rigorous econometric analysis was employed to investigate their empirical validity in the Nigerian context. The results of the analysis demonstrate a statistically significant and negative relationship between the unemployment rate and GDP growth. Specifically, a one-percentage-point increase in the unemployment rate is associated with a substantial decrease in GDP growth of approximately 2.5 percentage points. These findings affirm the relevance of Okun's Law in Nigeria, highlighting the significant effect of unemployment on economic performance. The study also provides valuable insights for policymakers, offering evidence-based recommendations to guide the formulation of effective macroeconomic policies, including targeted measures to reduce unemployment and enhance economic forecasting.

**Keywords:** Economic Growth, Unemployment, Gross Domestic Product, Okun's law.

## INTRODUCTION

The relationship between unemployment and economic growth has been a focal point in economic research, with Okun's Law standing as a well-established concept. Okun's Law posits a negative correlation between economic growth and unemployment, suggesting that a one percent increase in unemployment corresponds to a two percent decrease in GDP (Okun, 1962). Understanding the dynamics of Okun's Law is of paramount importance for policymakers as they navigate the complexities of macroeconomic policies. This law provides a crucial framework for policy decisions, especially in the context of managing inflation and unemployment. For instance, policymakers tend to employ expansionary measures during periods of high unemployment to boost economic growth and reduce joblessness. Conversely, during phases of economic prosperity with low unemployment, contractionary policies may be implemented to control inflation (Hobijn & Sahin, 2007).

Okun's law examines the statistical relationship between unemployment and economic growth, elucidating the simple logic that underpins it. As the theory suggests, increased output is associated with higher employment rates. Conversely, an upsurge in unemployment is tied to decreased output, contingent on the labor force. In the currently accepted version of Okun's Law, a one percentage point reduction in the unemployment rate over a year necessitates GDP to grow approximately two percentage points faster than the rate of potential GDP growth during that period. To illustrate, if potential GDP growth stands at 2%, Okun's Law implies that GDP must expand at a rate of approximately 4% for one year to achieve a one percentage point reduction in the unemployment rate.

However, despite a substantial body of research on Okun's Law, consensus regarding its empirical validity and operational mechanisms remains elusive. Some scholars argue that its applicability varies across different economic contexts, while others contend that the strength of this relationship fluctuates over time and among different countries (Ball, Leigh, & Loungani, 2017).

This paper aims to contribute to the comprehension of Okun's Law by examining its relevance in the Nigerian economy through a diverse set of analytical methods. By scrutinizing this relationship, this study seeks to offer valuable insights for policymakers as they chart macroeconomic policies that are both effective and well-formed.

While numerous studies in the literature have explored theoretical and empirical relationships between unemployment and economic growth, a prevailing theme is the ongoing debate. This stems from the multitude of contrasting and conflicting results in these studies. Consequently, this study is positioned to clarify the true empirical nature of the relationship between unemployment and economic growth in Nigeria and make pertinent policy recommendations.

Based on this premise, this paper seeks to contribute to the ongoing discourse surrounding Okun's Law, a concept that remains a subject of substantial debate in economic literature. By exploring into its connection with the Nigerian economy, this study aspires to shed light on the mechanisms that inspire this law and provide policymakers with illuminating insights to guide the formulation of effective macroeconomic policies. The subsequent sections of this study are organized as follows: Section 2 presents the theoretical considerations and a review of relevant literature. Section 3 outlines the empirical methodology, Section 4 provides the analysis, results, and discussion, while Section 5 concludes and offers policy implications.

## **LITERATURE REVIEW**

### **Review of Empirical Studies Regarding Okun's law**

The relationship between economic growth (output) and rate of unemployment has generated large volume of empirical studies since the pioneer work of Okun (1962). The available literature on Okun's law is extensive and for space constraint, some of these studies are selected for review as follows:

#### **Evidence from around the World**

Studies have evaluated the validity of Okun's law using a sample of developed countries. Farsio and Quade (2003) empirically investigated the connection between unemployment and GDP using twenty years of quarterly data for the United States. Using simple regression, the authors determined that the unemployment rate has a significant and negative effect on economic growth, however, the coefficient estimate is much less than Okun's estimate. Furthermore, the unemployment rate Granger causes economic growth, and this relationship was stable for various sub-periods. The authors concluded that Okun's coefficient varies for countries and across different samples.

Moreover, Villaverde and Maza (2009) verify the validity of Okun's law for the Spanish regions over the period 1980 – 2004. The study provides evidence in support of a negative relationship between unemployment and output for most of the regions and for the whole country. The study, however, further reveals different estimates of Okun's coefficients across the regions which could be attributed to regional disparities in productivity.

Also, Zagler (2003), analyzes a vector error correction model of economic growth and unemployment in four major European countries, France, Germany, Italy and United Kingdom. The study finds the existence

of positive long-run relationship between economic growth and unemployment; a finding which goes contrary to Okun's law. However, the short-run dynamics of the two variables of interest indicates agreement with Okun's law. The study further reveals that Okun's coefficient is in agreement with previous estimates for the countries in the sample with the exception of United Kingdom.

Similarly, Kamgnia (2009) empirically evaluated the growth intensity of employment in 39 African economies from 1995 to 2000 using fixed effects and generalized method of moments (GMM) estimators. The results of the fixed effects estimation indicate that economic growth significantly influences employment, and the results of the GMM estimation demonstrate that the short-term effect of economic growth is weak.

Moreover, Ashipala and Eita (2010), using Output-gap modeling analysis of the cointegration (ECM) in Namibia from 1971-2007 shows the absence of the relationship of Okun in Namibia. However, the growth of investment and the wages flexibility tend to reduce the unemployment rate. Furceri (2012) using Output-gap modeling Regression in static panel (MCO) and dynamic panel (GMM) for Algeria between 1980-2008 find Validity of the law, but weakness in the Okun's coefficient (-0.05). The dominance of low growth-jobs sectors and the rigidity of labour market institutions have a great impact on unemployment and its reaction to growth. Similarly, Bouaziz and El Andari (2015) using Output-gap modeling Analysis of the cointegration (ECM) in Tunisia 1990q1-2014q1 shows that The Okun's law is valid in Tunisia, with a coefficient that is around -0.7.

### **Empirical Evidence from Nigeria**

On Nigeria, Arewa and Nwakanma (2012) conduct an empirical evaluation of the relationship between output and unemployment using the first difference and output-gap models of Okun's law. The study finds no evidence to support the validity of Okun's law in Nigeria. Also, Ditimi and Ifeakachukwu (2013) Uncovered similar results of the positive relationship between unemployment and growth. Also, Omitogun & Longe (2017) investigated the impact of unemployment on the economic growth of Nigeria using secondary data in order to examine the dynamic effect of unemployment on growth. They observed that the impact of unemployment varies with time due to the effort made by the government to eradicate it in the country.

Similarly, Enejoh and Tsauni (2017), uncovered Contrary findings in their study of Nigeria between 1970s and 2016, they showed a long run positive relationship between unemployment and output and that unemployment rate had a positive impact on growth in the country. This was in line with a previous study conducted by Aliyu (2012), which employed Okun's model, and which showed a negative relationship in the short run, but that in the long run, the relationship became positive.

### **Theoretical framework**

This section establishes a connection between unemployment and output. As macroeconomic theory provides us with relatively few models linking the unemployment rate to GDP growth. Researchers have relied on Okun's law when examining the link between the unemployment rate and output growth. The explanation of Okun's law is very simple; As aggregate demand changes, firms/producers change their output plans, which causes variations in the demand for labor and subsequently, changes unemployment rates.

According to Farsio and Quade (2003), variations in unemployment likely lead to variations in output in the opposite direction. The authors argued that, although numerous factors cause variations in output, unemployment is the most visible because it has a direct impact on production. To a greater extent, many

scholars believe that a reduction in the unemployment rate should increase the production of goods and services.

Two methods have been used to estimate the Okun coefficient, the output-gap method and the second alternative is to use the GDP growth and a first difference measure of unemployment. In Okun’s original paper, the estimation is done using the gap method, where unemployment (UNEM) is dependent on deviations of actual output (GDP) from potential output (GDP). The relationship is specified as follows.

$$UNEM - UNEM^* = a + b (\text{output gap}) \dots\dots\dots (1)$$

Assuming that the output gap is computed as the first difference of output (economic growth rate), then a new equation is obtained as follows:

$$\Delta UNEM = a - b (\Delta GDP/GDP) \dots\dots\dots (2)$$

The second alternative is to use Okun’s first-difference method, as shown in (3) which will test the relative sensitivity of output to unemployment changes.

$$(\Delta GDP/GDP) = a - b UNEM + \epsilon \dots\dots\dots (3)$$

$$\Delta \log GDP = a - b \Delta UNEM + \epsilon \dots\dots\dots (4)$$

Equation 4 clearly indicates that output is dependent on unemployment (UNEM), and that the relationship between the variables is negative. The estimate of the coefficient ‘b’ represents Okun’s coefficient.

## METHODOLOGY

### Data

This study utilizes annual time-series data for the period 1991–2021 for the Nigerian economy, extracted from the World Development Indicator of the World Bank Data Bank (World Bank 2022). The data consists of 30 observations for each individual variable, including unemployment total (UNEM) as a percentage of total labour force (modelled using ILO estimates), and Gross Domestic Product growth (annual %) (GDPG). To evaluate the empirical evidence of the relationship between these variables, a quantitative approach using econometric techniques has been adopted, specifically the Ordinary Least Squares (OLS) regression technique.

### Model Specification

The model used was an adapted form of Okun’s (1962) model. The Difference model, which is well-suited for the time series data spanning from 1991 to 2021. It enables for the investigation of the dynamic relationship between GDP and Unemployment adjusted for endogeneity, and drive policy relevant insights. Its ability to capture yearly changes in economic variables aligns with the research goals

The original Okun’s law thus states: –

$$\left(\frac{\Delta GDP}{GDP}\right)_t = a - b \Delta UNEM + \epsilon$$

Where:

$(\Delta GDP/GDP)_t$  is the change in output at period  $t$ ,  $-b$  is the Okun's coefficient that shows a negative association between unemployment and growth, whereas  $\Delta UEMP$  is the change in unemployment (Noor et al. 2007). Thus, the modified Okun's model of the relationship is:

$$GDP_t = f(\text{UNEM})$$

Equation above shows that GDP is the function of unemployment, which can be explicitly described as: a change in the economic growth brought about by a change in unemployment.

The relationship can be specified as follows.

$$GDPG_t = \beta_0 + \beta_1 \text{UNEM}_t + U_t$$

Where;

GDPG = Gross Domestic Product Annual Growth

UNEM = Unemployment Rate

U = Disturbance Term.

$\beta_1$  = Intercept,  $\beta_2 - \beta_2$  = coefficient of the independent variables.

### Test of Hypotheses

For the purpose of this study, Farsio and Quade (2003) are followed and hypothesize that a decrease in the unemployment rate will cause output to expand. This implies that the growth rate for GDP (GDPG) and the unemployment rate (UNEM) should be negatively related.

**Null Hypothesis:** There is a negative relationship between UNEM and GDPG

**Alternative Hypothesis:** There is a positive relationship between UNEM and GDPG

## RESULTS AND DISCUSSION

This section contains detailed presentation and discussion of data analysis and the result of this study. The findings are presented under the following tables; Augmented Dickey Fuller unit-root Test, Heteroskedasticity test White, Serial Correlation LM Test and Regression Analysis

### Unit Root Test Results

In this section, the stationarity of time series data was assessed using two widely recognized statistical tests: the Augmented Dickey-Fuller (ADF) and Philips-Perron (PP) tests. These tests evaluate whether the variables exhibit unit roots, indicating non-stationarity. The null hypothesis for both tests assume the presence of a unit root, while the alternative hypothesis suggests otherwise.

The results of these unit root tests are presented in Table 1 below. A compelling evidence was found that all the variables under consideration, namely GDP growth (GDPG) and the unemployment rate (UNEM), are integrated of order  $I(0)$ , which means they are stationary at level.



**Table-1.** Unit Root Test for Stationarity

Variables	ADF	PP	Order of Integration
GDPG	-2.619160 (-2.918776)	-2.619160 (-2.894240)	I(0)
UNEM	-3.603202 (3.625492)	-1.610211 (1.856935)	I(0)

Source; Eviews 8.

**Note:** Values in parentheses represent critical values.

These results provide a strong foundation for the analysis, as they confirm that the variables do not exhibit non-stationarity. In practical terms, this means that the variables are suitable for further econometric analysis, ensuring the reliability of the findings.

### Heteroskedasticity test

In the realm of statistics, heteroskedasticity is a phenomenon where the variance of a variable is not constant over time, potentially indicating irregular patterns in data. Detecting heteroskedasticity is essential in econometric analysis to ensure the validity of regression results.

In the study, the White Heteroskedasticity Test was employed to investigate the presence of heteroskedasticity. This test examines whether the standard errors of the variables, observed over a specified time span, exhibit non-constant patterns. The outcome of the test is presented in Table 2, which displays relevant statistics and their associated probabilities.

Table 2: Heteroskedasticity Test; White

F-statistic	0.480281	Prob. F(1,28)	0.4940
Obs*R-squared	0.505909	Prob. Chi-Square (1)	0.4769

Source; Eviews 8.

The results reveal that, dataset exhibits homoscedasticity, as the probability associated with the chi-square statistic exceeds the conventional 5% significance threshold. In simpler terms, the standard errors of the variables remain fairly constant over the examined time period, ensuring the reliability of the regression analysis.

### Serial Correlation LM Test

Serial correlation, also known as autocorrelation, is a phenomenon in time series data where a variable's current value is correlated with its past values over a series of time periods. In the analysis, it aim to identify any signs of serial correlation within the data, which could affect the reliability of the results.

To this end, a Breusch-Godfrey Serial Correlation LM Test was conducted. This test assesses whether there is any systematic relationship between a variable's current value and its lagged values over time. The results, presented in Table 3, indicate the presence or absence of serial correlation. The results demonstrate that there is no significant evidence of serial correlation. Specifically, the probability associated with the

observed R-squared value exceeds the typical significance level of 5%, further confirming that serial correlation is not present in the data.

F-statistic	2.462197	Prob. F(5,23)
Obs*R-squared	10.45934	Prob. Chi-Square (5)

Source; Eviews 8

### Ordinary least squares regression (OLS)

The Ordinary Least Squares (OLS) regression is a fundamental statistical technique used to estimate the coefficients of a linear regression equation, elucidating the relationship between one or more independent variables and a dependent variable. In this study, OLS regression was employed to examine the association between Gross Domestic Product Growth (GDPG) as the dependent variable and the Unemployment Rate (UNEM) as the independent variable.

Table 4 below presents a regression analysis conducted between GDPG as dependent variable and unemployment rate as the independent variable. The main reason for regressing the series is to test the relationship that unemployment has on Gross Domestic Product in Nigeria within the study period.

The result shows that the relationship between unemployment and GDP growth is statistically significant and negative. This means that a 1% point increase in unemployment is associated with a decrease in GDP growth of approximately 2.5 percentage points.

Table 4: A Regression Analysis: GDPG (Dependent Variable)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.685128	0.687788	6.811875	0.0000
UNEM	-2.547693	1.108179	-2.298991	0.0292

Source; Eviews 8

These findings align with the principles of Okun's Law and support its applicability in Nigeria. They imply that changes in the unemployment rate play a significant role in influencing GDP growth, which holds vital implications for economic policy and decision-making. Specifically, a one-percentage-point increase in the unemployment rate is associated with a substantial decrease in GDP growth of approximately 2.5 percentage points. This empirical evidence aligns with the core principles of Okun's Law, which posits that variations in unemployment have a discernible impact on economic growth.

This finding is consistent with the work of Farsio and Quade (2003), who empirically examined the connection between unemployment and GDP growth in the United States. Farsio and Quade's study, based on two decades of quarterly data, found that the unemployment rate exerts a significant and negative influence on economic growth. Notably, the study extends this relationship to the Nigerian context, affirming that Okun's coefficient holds relevance beyond national borders. However, it's crucial to acknowledge that the magnitude of the coefficient may vary among countries and across different samples.

On the contrary, this results deviate from the findings of studies such as Ditimi and Ifeakachukwu (2013) and Zagler (2003). These studies uncovered a positive relationship between unemployment and economic growth, contradicting the tenets of Okun's Law. Such inconsistencies underline the complexity of economic



dynamics and underscore the importance of examining country-specific factors and time periods when assessing the applicability of economic principles.

In summary, this study contributes valued insights into the relationship between unemployment and GDP growth in Nigeria. The results affirm the relevance of Okun's Law in this context, emphasizing the negative impact of unemployment on economic performance. These findings hold critical implications for policymakers and provide a basis for designing effective economic policies to promote growth and reduce unemployment in Nigeria.

## CONCLUSION

This study empirically examines the relationship between unemployment and Gross Domestic Product (GDP) growth in Nigeria during the period from 1991 to 2021. The analysis leverages secondary data sourced from the World Bank and employs econometric modeling, particularly Ordinary Least Squares (OLS) regression, to analyze this relationship, some of the key conclusions of this study are the analysis demonstrates a statistically significant and negative relationship between the unemployment rate and GDP growth. Specifically, a one-percentage-point increase in the unemployment rate is associated with a substantial decrease in GDP growth of approximately 2.5 percentage points. This highlights the importance of unemployment as a determinant of economic performance in Nigeria.

These results provide empirical support for Okun's Law in Nigeria, indicating that unemployment is a meaningful predictor of GDP growth in the country. However, the study also highlights the variability of this relationship, which may differ in other economic contexts.

## Policy Recommendations

The outcomes derived from this study can be instrumental for policymakers in designing effective economic strategies about how to promote economic growth and reduce unemployment for example:

**Targeted Policies to Reduce Unemployment:** Policymakers can leverage this evidence to design and implement targeted policies aimed at reducing unemployment. Options include investing in education and training programs to enhance workforce skills or providing incentives to businesses that hire new employees.

**Economic Forecasting:** The strong relationship observed in the analysis allows for reliable economic forecasting. Policymakers can use this insight to predict future GDP growth and develop proactive policies to mitigate the effects of economic downturns.

In conclusion, this study contributes to the ongoing discourse surrounding Okun's Law, a concept that has been the subject of significant debate in economic literature. By analyzing its relationship with the Nigerian economy, this study adds to the understanding of how unemployment impacts economic growth. The findings offer valuable guidance for policymakers, providing evidence to inform economic policies and stimulate growth while addressing the challenge of unemployment in Nigeria.

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