



# Economic Growth and Labour Market Dynamics in Nigeria: Further Evidence from ARDL Bound Testing

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## Abstract

Recently the phenomenon of jobless growth has become common, defying the famous Okun law which predicted increase in job with increase in economic growth. Many factors have been advanced as explanations for this, most prominent of which are changes in the labour market and lopsidedness in economic growth. This paper is an attempt to measure labour market dynamics in Nigeria focusing on the relationship between economic growth and unemployment. The paper used data from 1991 to 2020 and employed GMM and ARDL models to analyze the data. Unlike the Okun law which prophesies negative relationship between unemployment and economic growth, the result from this analysis show that there is positive relationship between unemployment and economic growth, confirming the existence of the phenomenon of jobless growth in Nigeria. The paper recommended structural changes in the economy and the labour market.

**Keywords:** Unemployment; Economic growth; Okun law; ARDL; GMM; Nigeria.

## 1. Introduction

Economies around the world have been preoccupied with finding ways to deal with the problem of unemployment. Nigeria like other countries around the world is bedeviled by the devastating effects of unemployment on its citizens. The increase in unemployment in recent years has been indirectly linked to increase in suicide rate in Nigeria, as consequence of the menace (Mukhtar and Abdullahi, 2020). Thus, Nigeria is not an exception in finding out ways to create jobs and reduce high unemployment. Recently, Nigerian government has introduced programs to employ 774,000 people as way of helping people out of the suffering caused by the Covid 19 induced recession. Due to poor planning and slow economic growth, the problem of unemployment in Nigeria has become endemic. Efforts to diversify Nigerian economy have been on the Nigerian government agenda since 1980s when structural adjustment program (SAP) was introduced, but not much has been achieved. Despite the billions of Dollars in annual oil revenue, Nigerian governments have failed to use the resources effectively to develop other areas of the economy such as manufacturing, information technology and agriculture. The liberalization of Nigerian economy by Obasanjo and Jonathan governments have not achieved the desired effects, instead resulting in more unemployment, poverty and made Nigerian economy more import depended (Abdullahi, 2018). The nature of relationship that exist between output growth and unemployment has been studied on and off for decades. But, as an empirical area of study this is not a matter that is going to go. According to Mankiw (2007), conditions in labour market portray business cycle phenomenon just like in national income accounts data. Unemployment rise and fall with recession, during the period of recession it goes up and during the period of growth it comes down. The phenomenon of unemployment and the damages it cause will continue to be studied using new available data and new method of analysis. It is widely argued that in economies like Nigeria's dominated by government or one sector (the oil sector), growth in this sector cannot decrease unemployment since majority of people are not working in the sector.

Because of the nature of labour market in developing economies such as that of Nigeria unemployment tend to be classified as low despite the fact that poverty level is high. This because of the fact that most employment in poor countries such as Nigeria is in informal sector where wages are very low not enough to pull a large family out of poverty. According to An *et al.* (n.d) this implies very low unemployment rates in low and lower middle income countries (LLMICs) – according to the international definition- thus a low correlation between changes in unemployment and the business cycle. In Nigerian economy, earnings from crude oil have amounted to over a trillion Dollars in the past three decades. On the state of Nigerian economy, for example, Abdullahi (2018) observed

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that “Inflation rate rises and falls like growth in the economy. As a result, the economy remained heated causing frictions. Inflation and unemployment in Nigerian economy have remained stubbornly high, in double digits. According to conventional economic theory rate of unemployment should come down when there was high inflation. But, wastefulness at all level of governments hampered prudent management. Wastages, declining foreign reserve, absence of conducive economic environment, and state of the global economy had contributed to the deterioration in foreign exchange.” This paper aims to provide further evidences on the relationship between unemployment and economic growth in developing countries such as Nigeria. It focuses on the post structural adjustment program (SAP) period, when economic liberalisation and free market policies have the upper hand. Stylize fact has shown that the problem of unemployment has become more chronic after the return to civilian role in 1999; despite the fact that the period from 1999 to date has generated more revenue to the government than any period before it. Unlike the period when it is hard for employers to fire their workers, the coming of more liberal economic policies made it easier for employers to fire their staffs. Structural changes in Nigerian economy are at the heart of changes witnessed in Nigerian labour market in recent years. The paper used data from 1991 to 2020 using GMM and ARDL economic techniques to analyze the data. The paper is divided into introduction, literature review, data and methodology, implications and conclusion sections.

## 2. Literature Review

Okun law states that there exists an inverse and the non-proportionate relationship between output and unemployment. According to the original Okun law, 1 percent increase in economic growth results in a 3 percent decrease in unemployment. Okun law is a statistical relationship rather than structural feature of an economy. Though, according to [Knotek \(2007\)](#) it enjoys empirical support. Okun law shows that the determinants of short run economic growth are different from the determinants of long run economic growth. While long run economic growth is determined by technological progress, short run economic growth is determined by utilization of labour force ([Mankiw, 2007](#)). [Knotek \(2007\)](#) updates Okun’s law using all of the data available since Second World War. He finds a negative correlation between quarterly changes in the unemployment rate and real output growth, which is quantitatively quite similar to Okun’s original estimates. According to the original Okun law, reducing inflation level by 1 percent requires about 2.5 percent of cyclical unemployment ([Okun, 1978](#)). One version of Okun law observes that deviation of output from its natural level is inversely related to the deviation of unemployment from its natural rate. Thus, when output is higher than the natural level of output, unemployment is lower than the natural rate of unemployment ([Mankiw, 2007](#)).

Scholars such as [Blanchard \(1999\)](#) have questioned the stability of Okun law due to factors such as strong international competitiveness, less legal protection for workers, and a general shift in firm spending toward a reduction in the labor force. There are also other factors that caused violation of Okun law, these are Labor force transfer among sectors, Increasing labor productivity, Increase in the total labor force and inaccuracy of data on unemployment rate and as well as economic growth ([Moosa, 2008](#)). According to [Knotek \(2007\)](#) empirical evidences have suggested that Okun’s relationship has varied considerably over time and over the business cycle. Despite that, Okun law can be useful as a forecasting tool—provided one takes instability into account. An, Ghazi and Prieto (n.d), test the performance of Okun’s Law in low and lower middle income countries. Their main conclusion is that the stylized fact, which is consistent in advanced countries, did not hold in these developing economies. [Babalola et al. \(2013\)](#) tests validity of Okun’s law in Nigeria between 1980-2012 using cointegration and Granger causality methods. The findings show that Okun’s coefficient estimates carry positive signs in both models and are in fact contrary to unemployment–output relationship. [Udude and Nnachi \(2017\)](#), examined if there is a significant long run relationship between growth rate and unemployment rate in Nigeria between 1980 and 2013. Their findings show that Okun’s law does not hold for Nigeria.

[Abubakar and Nurudeen \(2019\)](#), examines the relationship between unemployment and output in India by fitting the Okun’s law. DF-GLS and the impact models were estimated using linear and nonlinear econometric models. The result indicates that relationship between unemployment and output for the Indian economy is consistent with Okun’s law. The study found that, to get a 1% decline in unemployment, 25% nominal GDP growth rate is required. [Abu \(2017\)](#), employs the autoregressive distributed lag (ARDL) bounds testing technique to examine whether Okun’s law exists in Nigeria during 1970-2014, he augmented the independent variable with variable that measures the role of oil prices in the Nigerian economy. The results indicate that a cointegrating or long term relationship exists between the unemployment rate, economic growth and oil prices. The result suggests that Okun coefficient is not only unstable but varies for different countries, and does not remain constant for Nigeria. [Adeyeye et al. \(2017\)](#), investigates Okun’s law in Nigeria using dynamic model. The results show that only past output growth has significant effect on unemployment. In addition, it also shows that past unemployment is significantly and positively associated with present unemployment. Toda-Yamamoto Granger non-causality test finds no causality between unemployment and economic growth. [Bankole and Fatai \(2013\)](#) estimate Okun’s coefficient, and the validity of the law in Nigeria, using time series data in the period 1980-2008. They used Engle granger co-integration test and Fully Modified OLS for the analysis. The result shows that there is positive relationship in the Regression; thus, implying that Okun’s law is not applicable to Nigeria.

## 3. Data and Methodology

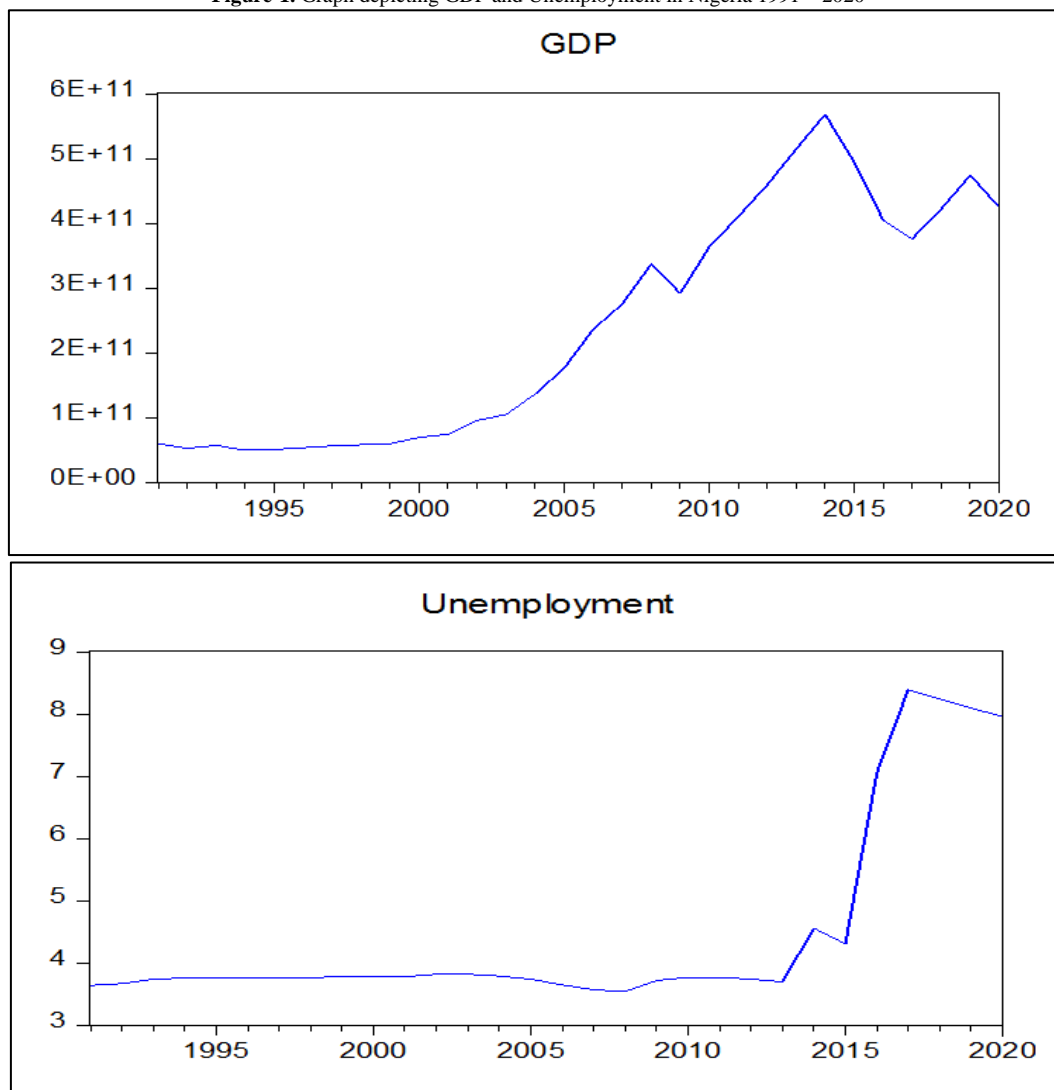
The data used for this study are of two categories: GDP and general unemployment data in one hand and GNI and Youth unemployment data on the other. But the primary data for the study are the annual GDP and unemployment, the use of GNI and youth unemployment is to analyze the relationship using alternative data. While

GDP is the total market value of all finished goods and services produced in Nigeria in a year; GNI is total income received by Nigeria from its residents and businesses regardless of whether they are located in Nigeria or abroad. Youth unemployment is very relevant because most of the unemployed today are young graduates who could not find job after graduating from schools. The data for the study were sourced from Nigerian Bureau of statistics and World Bank's World Development Index, from 1991 to 2020. See figure 1 for the graphical presentation of the data and its movements through the period of the study. The graphs show that both GDP and unemployment moved upward from 1991 to 2020, indicating some form of indirect comovement. The econometric techniques used for the analysis and estimation are GMM and ARDL models. The normal granger causality test is also conducted to find the direction of causality between the variables. Unit root test is conducted using ADF in order to find the stationarity level of the series. The Okun's econometric version of the model for the purpose of regression is

$$UNEMPL_t = \alpha + \beta GDP_t + \varepsilon_t \quad (1)$$

But, the dynamic model extension of the model shows the impact of previous rate of unemployment on present rate of unemployment. It also depicts how present output growth and previous output growth influence present rate of unemployment.

Figure-1. Graph depicting GDP and Unemployment in Nigeria 1991—2020



Source: Author's computations

### 3.1. Unit Root Tests

A time series data is stationary when its value tends to revert to its long-run average value as well as the properties of data series are not affected by the change in time only. But, the non-stationary time series does not tend to return to its long-run average value, hence, its mean, variance and co-variance also change over time (Shrestha and Bhatta, 2018). If the time series is non-stationary, it is said to have a unit root. A unit root test analysis whether a time series variable is non-stationary and possesses a unit root. The test is sometime linked with serial correlation tests. But, while processes with a unit root exhibit serial correlation, not all serially correlated time series have a unit root. An augmented Dickey–Fuller test (ADF) measures the null hypothesis that a unit root is present in a time series sample. ADF model tests unit root as follows:

$$\Delta y_t = \mu + \delta y_{t-1} + \sum_{i=1}^k \beta_i \Delta y_{t-i} + e_t \quad (2)$$

### 3.2. Granger Causality Test

Granger causality tests is normally use for determining whether one time series is useful in forecasting another series behaviour. A time series X is said to Granger-cause Y if it can be shown that the X values provide statistically significant information about future values of Y.

### 3.3. GMM

Generalized method of moments (GMM) combines observed economic data with the information in population moment conditions to produce estimates of the unknown parameters. GMM is generally used for the estimation of linear and non-linear models with applications in economics and finance. Unlike the popular maximum likelihood estimation (MLE), GMM does not need complete knowledge of the distribution of the data. It needs only specified moments derived from an underlying model (Pindyck and Rubinfeld, 1998). The GMM estimator can be written as:

$$\hat{\theta} = \arg \min \left( \frac{1}{T} \sum_{t=1}^T g(Y_t, \theta) \right)^T \widehat{W} \left( \frac{1}{T} \sum_{t=1}^T g(Y_t, \theta) \right) \quad (3)$$

But, the correspondent dynamic model showing the effects of present and past GDP and past unemployment on current unemployment for use in this paper is

$$UNEMPL_t = \alpha + \beta_1 GDP_t + \beta_2 GDP_{t-1} + \alpha UNEMPL_{t-1} + \varepsilon_t \quad (4)$$

### 3.4. ARDL Model

ARDL testing procedure helps us to know whether underlying variables in a model are cointegrated or not, given the endogenous variable. ARDL model takes sufficient numbers of lags to capture the data generating process in a general-to specific modeling framework. Pesaran and Shin (1999) and Pesaran *et al.* (1996) proposed the Autoregressive Distributed Lag (ARDL) approach to cointegration or bound procedure for a long-run relationship, irrespective of whether the underlying variables are I(0), I(1) or a combination of both. ARDL has the following advantages: (1) endogeneity is less of a problem; (2) it distinguishes between dependent and explanatory variables; (3) Error Correction Model (ECM) can be derived from the ARDL model by means of a simple linear transformation, which integrates short run adjustments with long run equilibrium without losing long run information. The following is the format of the ARDL model used for this work:

$$\Delta UNEMPL_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta UNEMPL_{t-i} + \sum_{i=0}^n \alpha_{2i} \Delta GDP_{t-i} + \beta_1 UNEMPL_{t-1} + \beta_2 GDP_{t-1} + \varepsilon_{it} \quad (5)$$

F-test tests for significance of the lagged levels of the variables. The null hypothesis of no cointegration is  $H_0: k_1 = k_2 = k_i = 0$ . It is tested against the alternative hypothesis of at least one non-zero result, i.e.  $H_1: k_1 \neq 0$  or  $k_2 \neq 0$  or  $k_i \neq 0$ . While the calculated F-statistics is compared with the critical values; where F-statistic exceeds the upper bound level, the null hypothesis is rejected, which shows the existence of co-integration. But, if F-statistic falls below the lower bound, null hypothesis cannot be rejected, implying the absence of co-integration. It is inconclusive if it falls within the upper and lower bounds.

## 4. Results and Analysis

### 4.1. Unit Root Tests

Starting with stationarity tests, the results of the unit root tests show that all the variables used for the study are stationary at level. See table 1 for details about the tests. This clear the way for conducting our analysis of the relationship between unemployment and economic growth.

**Table-1.** Results of Augmented Dickey-Fuller test statistic

Variable	Level of the test	t-statistics	P-value (5% level)
GDP	At level (0)	-0.579541	0.8604
GNI	At level (0)	-0.683131	0.8357
Unemployment	At level (0)	-2.833641	0.0699
Youth Unemployment	At level (0)	-1.986694	0.2900

Source: author's computation

### 4.2. Granger Causality Tests

The results of the Granger causality tests show no existence of causality from GDP to unemployment, GDP to youth unemployment, GNI to youth unemployment and GNI to Unemployment. Thus, short run causality is absence from our independent variables to the dependent variables. This shows possibility of weak short run relationship in the model if any exist at all.

**Table-2.** Result of Granger causality tests

Null Hypothesis	F-Statistic	P-value
UNEMPLOYMENT does not Granger Cause GDP	0.01969	0.9805
GDP does not Granger Cause UNEMPLOYMENT	24.5199	2.E-06
YOUTH_UNEMPLO_ does not Granger Cause GDP	1.13074	0.3401
GDP does not Granger Cause YOUTH_UNEMPLO_	11.9471	0.0003
UNEMPLOYMENT does not Granger Cause GNI	0.03377	0.9668
GNI does not Granger Cause UNEMPLOYMENT	24.5855	2.E-06

YOUTH_UNEMPLO_ does not Granger Cause GNI	1.14203	0.3366
GNI does not Granger Cause YOUTH_UNEMPLO_	10.9347	0.0005

Source: author's computations

### 4.3. GMM Tests

The results of the GMM tests show that there is dynamic causality from GDP to unemployment and from unemployment to GDP; there was also dynamic causality from youth unemployment to GNI. But, there was no dynamic causality from GNI to youth unemployment. Thus, unlike Granger causality that shows absence of causality from GDP to unemployment, GMM that is considered better than Granger causality in measuring dynamic causality shows the dynamic effects of economic growth on unemployment during the period of the study.

Table-3. Results of the GMM tests

Dependent variable	Independent variable	Coefficient	P-value
Unemployment	GDP	3.90E-12	0.0390
GDP	Unemployment	6.42E+10	0.0001
GNI	Youth Unemployment	4.94E+10	0.0033
Youth Unemployment	GNI	1.60E-12	0.5412

Source: author's computations

### 4.4. ARDL Bound Testing

Results from ARDL bound testing show the existence of cointegration between Unemployment and GDP, unemployment and GNI, youth unemployment and GNI and youth unemployment and GDP. The long run form of the coefficient of effect of GDP on unemployment within the ARDL model shows an insignificant positive relationship; the same thing with effect of GNI on unemployment. The finding of positive coefficient is contrary to Okun prediction, but it is not unusual.

Table-4. ARDL bound testing results

Dependent variable	Independent variable	F-statistics	Lower bound (5%)	Upper bound (5%)	Verdict
Unemployment	GDP	13.35062	3.62	4.16	There is cointegration
GDP	Unemployment	2.067171	3.62	4.16	No cointegration
Youth Unemployment	GNI	5.778266	3.62	4.16	There is cointegration
GNI	Unemployment	5.592215	3.62	4.16	There is cointegration
Unemployment	GNI	14.08016	3.62	4.16	There is cointegration
Youth unemployment	GDP	6.738616	3.62	4.16	There is cointegration

Source: author's computations

Various scholars have questioned the stability of Okun law due to factors such as strong international competitiveness, less legal protection for workers, and a general shift in firm spending toward a reduction in the labor force. There are also other factors that caused violation of Okun law, these are Labor force transfer among sectors, Increasing labor productivity, Increase in the total labor force and inaccuracy of data on unemployment rate and as well as economic growth (Moosa, 2008). Works in Nigeria that found violation of Okun law by finding positive relationship between unemployment and economic growth include Babalola *et al.* (2013), Adeyeye *et al.* (2017), Udude and Nnachi (2017) and Bankole and Fatai (2013).

### 4.5. Implications

The existence of positive relationship between economic growth and unemployment in Nigeria has refuted the Okun law in the case of Nigeria. One of the major reasons behind Nigerian economy inability to follow Okun law is the existence of jobless growth. This has made it possible for economic growth to take place without creating any job as a result. The mono economic nature of Nigerian economy that relied so much on exportation of crude oil is the main culprit for this. The widespread phenomenon of using part time staff, overtime hours and outsourcing have contributed to the phenomenon we are talking about. Thus, unless the phenomenon of jobless growth is address, Nigeria shall not expect much from higher economic growth. Creation of much needed job will require fundamental changes in the structure of the Nigerian economy. Henceforth, changes in the labour market shall be taken into consideration when generating data on unemployment.

## 5. Conclusion

This paper tests the effect of economic growth on unemployment in Nigeria, using different categories of data. The results presented in this study, showed that the data used for the study are stationary at level. Tests of ARDL cointegration revealed long-run association between unemployment and economic growth. Okun law has originally being shown to predict negative relationship between economic growth and unemployment, but a number of studies including this paper have found Okun law to be unstable and positive. This shall serve as a reminder that Okun's law—contrary to the use of the word “law”—is only a rule of thumb, not a structural feature of the economy. It is



merely a statistical relationship not an economic law, in the sense of economic law such as law of demand and supply. This has been associated with a number of factors which included changes in the labour market. Since Okun law is an empirical relationship; it may change from time to time, from one country to another depending on economic realities of that country. The findings of this research have practical applications; henceforth, forecasting unemployment by means of Okun's law shall be better done by taken these changes into consideration. Forecasts can be improved even better by allowing for a dynamic relationship between unemployment and economic growth. Nigerian authorities must find ways of creating jobs for the jobless roaming the streets all around the country. Economic growth that increases inequality and joblessness is recipe for revolution and social change. Henceforth, economic policies more oriented toward structural changes in the economy and reform in labor market would be more appropriate in the case of Nigeria.

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