

# “Economic growth and unemployment linkage in a developing economy: a gender and age classification perspective”

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# ECONOMIC GROWTH AND UNEMPLOYMENT LINKAGE IN A DEVELOPING ECONOMY: A GENDER AND AGE CLASSIFICATION PERSPECTIVE

## Abstract

This paper examined the growth and unemployment linkage from a gender-classification perspective using the Nigerian economic environment. The autoregressive distributed lag model in its baseline form, the bound test, and error correction representation were used as the estimation approach. Annualized time series spanning 1981 to 2017 were used for the variables of interest. Generally, it was found that female unemployment has a positive significant influence on GDP growth rate in Nigeria, while youth unemployment negatively and significantly influences GDP. It was also found that male unemployment does not significantly affect the GDP growth rate in Nigeria. In the long run, the main variables influencing GDP growth rate within the context of this study include unemployment rate, ratio of labor force size to the national population, female unemployment rate, and youth unemployment rate. The error correction representation and the bound test estimates confirm that growth adjusts to the dynamics of the studied unemployment variables. The study advocates for an increase in government capital expenditure, as this is theoretically and practically known to create new jobs. This spending should go into real and core productive sectors that would create upstream and downstream jobs opportunities.

## Keywords

Nigeria, ARDL, error correction model, labor force,  
bound test

## JEL Classification

J11, J64, O55

## INTRODUCTION

In recent times, the federal government of Nigeria has targeted job creation as its cardinal objectives in line with the ruling party campaign promises, but the unemployment figures persist. In Nigeria, it has been noted the rates of unemployment and growth in the economic trends in opposite directions, although with co-movements. With the year 2004 being an outlier for economic growth, unemployment is seen to fall when economic growth rose and vice versa. However, what one is not sure about this relationship is if previous unemployment values significantly relate to economic growth or if previous values of economic growth index relate to unemployment. Thus, this is the confusion in precise causality. However, unclear the relationship between unemployment and economic growth is, arguments have been raised that GDP should grow side by side with employment. This intuitively implies that employment increases as output rises since this would mean that more output would require more labor participation.

A second thought allows a room for considering the notion that increase productivity could also mean job losses. An observation could be that there is a dichotomy between the increase in output and job

losses because of higher capacity utilization and those related to long-term growth. They argue that reforms in the labor market, with lower wage costs (and increase in employment), will allow for growth in output in the adjustments. Furthermore, the output rise could be met with increases in capital stock because the profitable investment would arise as payment on capital rises. It thus becomes expected that an increase in labor productivity and labor demand, which as explained in market structures of the capital stock will be restored to initial levels, while the increase in capital stock would have negligible effects on wages over the long run relative to the short run. Another critical perspective is the notion that government regulation and taxation could dampen businesses' operation and heighten unemployment as the impact is more on smaller going concerns with lesser access to financial markets.

In light of the lack of clarity in the degree and direction of the growth and unemployment nexus, this study is embarked upon to examine this linkage in the Nigerian macroeconomic space.

There are indeed numerous value additions to this study to the body of knowledge. Firstly, the topic remains a relevant discourse to several interest groups. Economics and economies are concerned about growth and unemployment. Unemployment breeds poverty, crime, emigration, and overall economic instability. Moreover, issues surrounding economic growth cannot be overemphasized. In this light, the study would be providing institutions like the National Directorate of Employment (NDE) with suggestive policies focused on the channels through which unemployment is transmitted to the economy while making guided recommendations on how it can be managed. Secondly, the study adopts a recent estimation technique that is the ARDL bound test, as enunciated by Pesaran, Smith and Shin (2001). The ARDL method has relative advantages over other regression and cointegration methods. These include efficiency in the face of small samples. Besides, it tolerates variables with different lag structures. Finally, it is less discriminatory when it comes to the mix of the variables' stationarity properties. To ensure validity of estimates and the inferences drawn from them, a collection of post estimation tests are presented to ensure that the basic assumptions underlying the estimation method are not violated. The next section will focus on the literature review.

## 1. LITERATURE REVIEW

Countries across the globe have had a fair experience of unemployment at one period or another, with its influence reflected on macroeconomic indicators of different kinds. The Arab world was noted to have experienced a very high unemployment level to the tune of 11.3% in 2016 and an average of 11.4% between 2012 and 2016, as recorded by the World Bank Group (2017). Economic growth measured by GDP growth is seen to slow down from 5.2% in 2012 to 3.2% in 2016, while the standard of living is seen to rise from US\$ 6153.8 in 2012 to US\$ 6440.04 in 2016 (World Bank Group, 2017). This could be a reflection of population control since GDP growth rate slowed down over the period. Compared with OECD countries, which are categorized as developed economies, unemployment fell from 7.9% in 2012 to 6.3% in 2016, while inflation fell drastically from 2.46% in 2012 to 0.40% in 2016. In the United States of America, several government policies have been implemented to cater for

the diversity of the labor force, as a way to checkmate Chinese competitive pressure. This accounts for its unemployment rate falling from 8.1% in 2012 to 4.9% in 2016, while also experiencing improvement in the standard of living from an index of US\$ 49,497.59 per citizen in 2012 to US\$ 52,194.89 per citizen. This notwithstanding, the USA witnessed a decline in economic growth from 2.2% in 2012 to 1.6% in 2016, reflecting that the economy grew but at a decreasing rate. China and Sub-Saharan Africa (SSA) are incomparable by statistics. The data from the World Bank Group (2017) show that China's unemployment rate has an average of 4.5% between 2012 and 2016, while for the SSA region, it averaged 7.4% for the same period. This reflects a high unemployment level in the Sub-Saharan African region, where Nigeria is domiciled. Moreover, China's standard of living surpasses that of the entire SSA by a difference of US\$ 4480.84 per citizen on average for the observed period. This means that a citizen of China earns US\$ 4,480.84 more on average than an African living in the SSA region.

Nigeria, however, is observed to have experienced a reduction in her unemployment rate from 7.6% in 2012 to 5.0% in 2016 while enjoying an average per capita income of US\$ 2,494.4 within the observed period. However, economic growth in Nigeria dropped drastically to 1.5% in 2016, with a very high inflation rate of 15.70% in the same year (World Bank Group, 2017). Nigeria has implemented several policies to improve its economy, including recent diversification strategies aimed at engaging more youths in economic activities. However, most of these strategies have not yielded the desired result, as they have not brought the nation out of its economic quagmire.

According to Kazi and Leonard (2012), Nigeria is the most populous country in Africa and has an unemployment rate of about 24% within this period. The unemployment rate of persons between 15 and 24 years old stood at 5.2% in 2011 (World Bank Group, 2016). Kazi and Leonard (2012) noted that the unemployment rate for people in Nigeria aged between 25 and 44 years is 25%. Specifically, 75% of the total unemployed population falls within the age of 15-44 years. With unemployment being a major issue in Nigeria, it is evident that it is a threat and a major challenge to the nation's growth and development agendas. This has been reflected in the current civil unrest, militancy, and insurgency in the nation. Nigeria experienced tremendous growth after the independence of the nation when oil was discovered in commercial quantities. The discovery of oil coincided with the indigenization policy, which triggered increased participation of Nigerians in the productive sectors of the economy, with the attendant boost to job creation and empowerment of the labor force. This ordinarily should have addressed the unemployment challenges in the country, but that did not materialize in the long run.

Nigeria is considered a middle-income and monoculture economy. It is considered as an emerging market, with rapidly expanding entertainment, financial, and communication sectors. Growth in 2010, as opined by Akeju and Olanipekun (2014), was due to the comprehensive economic management policies and massive economic reforms. It is pertinent to note that growth was mainly attributed to the performance of the non-oil sector, which had tremendous growth of 8.5% in tandem

with the momentous surge in the oil sector output. They further observe that by 2011, real GDP was driven predominantly by crop production (28% of real GDP), wholesale and retail trade (28.8% of real GDP), and telecommunications sector (21.4% of real GDP) with the visibly overall development of the external sector. Despite this trend, relatively high poverty and unemployment incidents persist in the Nigerian economy. Such is evident in the low patronage of the Nigerian crude oil, which takes away a significant portion of the income of many households, thereby lowering the standard of living in Nigeria. This further resulted in a low accumulation of reserves and domestic investment, as investors seem demotivated to spur economic activities.

One of the earliest and most prominent theories of unemployment is attributed to Keynesians. This drew a line between potential and actual unemployment levels. Keynes (1936) popularized what is today referred to as deficient-demand unemployment or cyclical unemployment, which sees unemployment as a product of excess demand over aggregate supply, otherwise seen as a deficiency in demand.

Over time, as economic thought progressed, there have been advances in the literature explaining growth. These are currently referred to as the growth theories, with each proponents lending support empirically and theoretically to the tenets of the theories: from the exogenous growth theory, notably the Harrod-Domar growth theory and the Solow-Swan model, the endogenous growth theory, notably the AK model, Schumpeterian growth model, up to the Arthur Lewis theory of the dual economy. The model, as developed by Harrod (1939) and Domar (1946), is also popularly seen as a post-Keynesian model of growth (Hagemann, 2009). The model explains growth on the premise of three types of growths, namely warranted growth, actual growth, and the natural rate of growth. Warranted growth briefly describes the growth rate at which various respective economies do not expand indeterminately or alternatively go into recession, while actual growth explains the rate at which a country's GDP grows annually after being adjusted for inflation. Natural growth implies the growth precursory for an economy to sustain full employment.

The Solow (1956) and Swan (1956) model in later years was taken to become the foundation for the exogenous growth theory. It assumes the diminishing returns of both labor and capital. The Solow-Swan model entails a production function in which output is related to factor inputs-labor and the stock of accumulated physical capital goods such as machinery, computers, transport equipment, etc. Labor, in this case, is considered just one type of factor. The idea of diminishing returns of both labor and capital allows for the occurrence that as more stock of capital is used up, less than a proportionate rise in output will occur, provided labor remains constant as recorded in Van der Ploeg and Tang (1992). Thus, less output or eventually none is produced at the instance of more capital stock, which yields a seizure in output growth. More facts about the Solow-Swan model are that with improvement in capital and labor productivity due to technology, the fall in the rate of returns on investment is forestalled, which makes labor grow at an exogenous rate. This means that capital accumulation is the driving force for technical development, and even though the neoclassical model does not explain this development, it adds a trend for technical progress in the model, which renders explanation to the long-run economic growth rate (De Jager, 2004).

The Schumpeterian growth model, as developed by Schumpeter in 1912, which was later translated in 1934, explains economic growth on several factors. He based economic output as a function of other produced means of production, labor, natural resources, technology, social setup, or social organization. He further explains that the production in any given economy relies on the rate of change of productive forces, namely the rate of change of technology, the rate of change of social setup, growth rate of labor, and the accumulation of natural endowments. In two distinctive terms, he attributes these to the *growth components*, namely capital, labor, and natural resources, and then the *evolution components*, which include technology and social organization. Schumpeter (1912, 1934) made claims concerning institutional and social changes attached to the technical, psychological, social, and political undertone of any given economy. The precursors he identified to economic development include introducing new techniques of production, a change in the organization and

structure of some industries, the introduction of some new goods, the discovery of some new markets and some new supply sources. With much of this growth model hinging on innovations and new discoveries, it has over time been ascribed as *the invention and innovation growth model*.

This economic growth model is also known as the Arthur Lewis theory of the dual economy or simply the Lewis model. It was propounded by Lewis (1954) who combined the experience of developed countries with the classical economists' ideas to make a broader picture of the development process. The theory divided the overall economy into two which are the sophisticated capitalist economy such as the US, and, of course, current China and the backward subsistent economy, such as Nigeria or other African nations, with the subsistent economy being governed by informal institutions and practices, such that profit is not maximized. The theory argued further that labor from the informal sector is in unlimited supply, and each earns above its marginal product. While in the capitalist (formal) economy, accrued profits and higher returns on capital are from their use of underpaid labor. The model assumes that a developing nation has surplus unproductive labor in its subsistent economy, which is usually agrarian-based, and observed that this surplus labor is attracted to work in the capitalist economy in the industrial sector due to higher wages that are much higher than paid in the former. Another assumption of the model is that wages are somewhat fixed in the latter, and capitalists (entrepreneurs) earn profit from charging prices above the fixed wage rates. The model also assumes the reinvestment of excess profits into the economy-fixed capital. In the end, the overall economy is transformed from a subsistent economy to an industrial-based economy.

A strong theoretical approach to the study of unemployment and growth nexus largely draws from the work of Okun (1962). Okun's law is usually expressed in either the growth form or the difference form, but for estimation, the difference form is adapted in most instances.

Abel, Bernanke, and Croushore (2011) record the difference form of Okun's law as:

$$\frac{\bar{Y} - Y}{Y} = \alpha(u - \bar{u}), \quad (1)$$



where  $\bar{Y}$  – potential GDP,  $Y$  – actual GDP,  $\alpha$  – rate of change of economic growth concerning changes in unemployment,  $u$  – actual unemployment rate,  $\bar{u}$  – natural rate of unemployment. With the explanation above, it is expected that the parameter estimate of the difference in unemployment to be negative for both the left-hand-side and right-hand-side variables. This is also known as the Okun's coefficient.

In deriving the growth form of the equation (1), the model could be rewritten as shown as follows:

$$\frac{\Delta Y}{Y} \approx k - \alpha(\Delta u), \quad (2)$$

where  $k$  is an approximation of the growth rate in (full employment) GDP to its average value.

Okun's law is also applicable in the Nigerian context since unemployment is still argued to reduce productivity. Mankiw (2010) argues that with a constancy of unemployment, the other factors that would be responsible for economic growth is evidence of the Solow model, for which he specifies growth in labor, capital accumulation, and technological advancement. This, according to Knotek (2007), is seen as the production-function version of Okun's law. It is argued that the unemployment rate is insufficiently capable of capturing all idle resources in any given economy, with these idle resources emanating from various sources, as corroborated by Mankiw (2010) earlier. The aims and objectives of the study are presented in the next section.

## 2. AIMS OF THE STUDY

The aim of the paper is to determine the extent to which the general unemployment rate influences GDP growth rate in Nigeria. As a departure from prior studies, attention is given to the gender-based and age-based classification of unemployment and their influences on the growth rate of the Nigerian economy. The paper has utilized an annualized time series from 1981 to 2017 in its analysis. Specifically, the objectives of this study are:

- To determine the degree and direction of influence of general unemployment on the GDP growth rate in Nigeria.

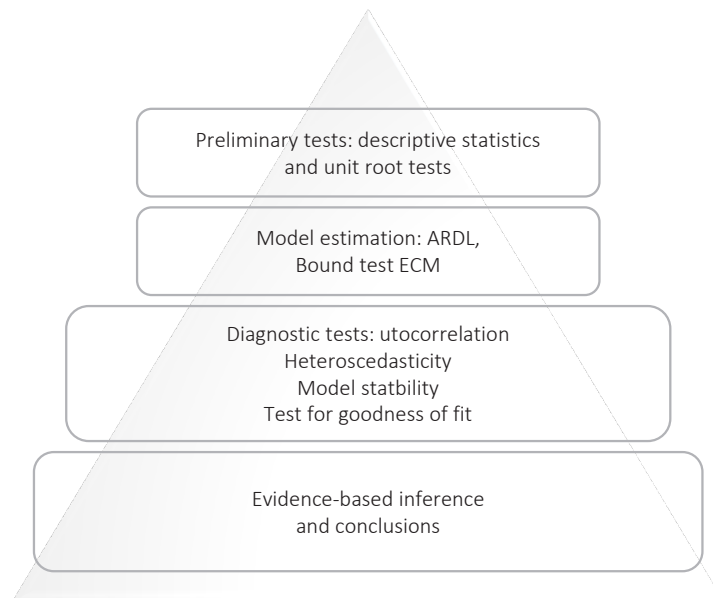
- To investigate the degree and direction of the effect of youth unemployment on the GDP growth rate in Nigeria.
- To determine the degree and direction of the impact of female unemployment on the GDP growth rate in Nigeria.
- To investigate the degree and direction of the impact of male unemployment on the GDP growth rate in Nigeria.

The hypotheses that guided the findings recorded in this study followed the specific objectives stated earlier. The next section addresses the research method.

## 3. METHODS

As detailed in the subsections further, the study follows the ex-post facto approach, a common technique in carrying out the research in economics and social sciences. This is justified by the fact that the data in this study were not obtained through experiments; rather, they are variables collected from existing sources for analytical and predictive purposes. The study follows the scientific process of empiricism and evidence-based inference. The analytical processes are diagrammatically illustrated in Figure 1.

The data for this study were secondary in nature and range annually from 1981 to 2015 from the 2016 publication of the Central Bank of Nigeria (CBN) and the World Bank's World Development Indicator (WDI). In the 1980s, Nigeria introduced austerity measures to combat unemployment problems, prominent amongst which is the 1986 Structural Adjustment Program, whose effects trickled down to successive years. The basic demographics of the Nigerian economy include a life expectancy of 53 years in 2015, a population of 185,989,640 in 2016, a total youth unemployment rate of 7.8% in 2016, a total unemployment rate of 5% in 2016, and a national income (GDP) of N552,097.46 in 2016 (World Bank Group, 2017). The variables to be used include real GDP growth rate measuring economic growth and unemployment rate annual data disaggregated into various components such as the unemployment rate for male, female, and youth, respectively.



**Figure 1.** Estimation procedure of the study

### 3.1. Model specification

Following the theoretical framework, the model for the empirical analysis of the study follows an adaptation of Okun's law is given as follows:

$$gdpg = f\left(\begin{matrix} unem, lapp, popg, \\ fune, mune, yune \end{matrix}\right). \quad (3)$$

In compliance with the dynamic form of Okun's Law, which caters to the autoregressive components of unemployment and economic growth, the model is explicitly specified as an ARDL model following the form presented in equation 3.3. Moreover, the unemployment variable is uncoupled into gender-based and age-based categorization.

$$\begin{aligned} \Delta gdpg_t = & \beta_0 + \sum_{i=1}^m \beta_1 \Delta gdpg_{t-i} + \\ & + \sum_{i=1}^n \beta_2 \Delta unem_{t-i} + \sum_{i=1}^o \beta_3 \Delta lapp_{t-i} + \\ & + \sum_{i=1}^p \beta_4 \Delta popg_{t-i} + \sum_{i=1}^q \beta_5 \Delta fune_{t-i} + \\ & + \sum_{i=1}^r \beta_6 \Delta mune_{t-i} + \sum_{i=1}^s \beta_7 \Delta yune_{t-i} + \\ & + \gamma_1 gdpg_{t-1} + \gamma_2 unem_{t-1} + \gamma_3 lapp_{t-1} + \\ & + \gamma_4 popg_{t-1} + \gamma_5 fune_{t-1} + \gamma_6 mune_{t-1} + \\ & + \gamma_7 yune_{t-1} + \mu_t, \end{aligned} \quad (4)$$

where *gdpg* = GDP growth rate, *unem* = unemployment rate, *lapp* = ratio of labor force size to national population, *popg* = population growth rate, *fune* = female unemployment rate, *mune* = male unemployment rate, *yune* = youth unemployment rate.

### 3.2. Analytic framework/procedure

Pre-estimation tests such as descriptive statistics, test for linear association, and test for unit root were used to determine the goodness of the data-sets for the study.

The ARDL was used to measure the baseline relationship among the studied variables. The bounds test is used to test the long-run status of the model, which also shows that the parameter estimates can explain the long-run degree of change between the unemployment-related variables and economic growth.

**Table 1.** Decision rule for bound test

State	Action	Inference
$F\text{-stat} > \text{upper bound}$	Reject null	There is cointegration
$F\text{-stat} < \text{lower bound}$	Refuse to reject null	There is no cointegration
$F\text{-stat}$ within lower and upper bound	Inconclusive	Cannot clearly say if there is cointegration or not

Diagnostic tests were conducted to determine the validity and reliability of the estimates. These in-

clude auto-correlation following Breusch-Godfrey test; the Breusch-Pagan-Godfrey test for heteroscedasticity; the CUSUM test for model stability.

## 4. RESULTS

### 4.1. Statistical properties of the series

The data used in the analysis of the discourse are presented here. The descriptive statistics are first discussed, and then other properties of the data follow in the subsequent sub-sections.

From Table 2, it can be viewed that the female unemployment rate has an average value of about 6.9%, while the male unemployment rate averaged 5.3%. The youth unemployment rate averaged 9.2%, and the overall unemployment rate in Nigeria has a mean value of about 13.7%, all for the periods spanning 1981 to 2016. GDP growth rate has a mean value of 3.73%, while the ratio of the labor force to the national population is estimated at 0.31. The overall population in Nigeria has an average growth rate of 2.58% between 1981 and 2016. The rest of the statistics concerning the range and deviation from the measure of central tendency, as explained by the standard deviation as presented in Table 2.

### 4.2. Time-series properties

The unit root test results are summarized and tabulated in Table 3.

It can be observed that only the GDP growth rate and population growth rate are stationary in levels and others at first difference. This satisfies the condition for the use of the ARDL as the variables are I(0) and I(1), as advocated for by Pesaran, Shin, and Smith (2001).

## 5. ARDL ESTIMATES

The ARDL estimation is summarized and presented in Table 4. The results are presented in parts, with the long-run and short-run differentiated.

The results from Table 4 reveal that unemployment has a significant positive influence on growth as measured by the GDP growth rate. This finding is not coherent with a priori expectation of a negative influence. It was also found that the ratio of the labor force size to national population negatively and significantly influences GDP growth rate in Nigeria. The expansion in population outweighs the expansion in the labor force size, thus

**Table 2.** Basic statistical properties

Var	Mean	Median	Maximum	Minimum	Std Dev	Skewness	Kurtosis	Jarque-Bera	Probability	Sum	Sum sq. dev.
FUNE	6.896972	7.228000	8.805000	4.199998	1.360732	-0.40223	1.823097	3.048372	0.217798	248.291	64.80575
GDPG	3.728381	4.345171	33.73578	-13.1279	7.569129	1.169653	8.761452	58.00002	0.000000	134.2217	2005.21
LAPP	0.313072	0.313111	0.316187	0.308561	0.002087	-0.32374	2.397233	1.173823	0.556042	11.2706	0.000152
MUNE	5.303499	5.617000	6.710000	3.296996	1.006036	-0.44733	1.845972	3.19829	0.202069	190.926	35.42382
POPG	2.580389	2.582130	2.715063	2.488183	0.06859	0.124695	1.689675	2.668719	0.263327	92.89401	0.165956
UNEM	13.68611	9.550000	46.30000	5.300000	10.26707	1.732085	5.310832	26.01063	0.000002	492.7	3689.443
YUNE	9.221917	9.609500	11.81200	5.754001	1.787954	-0.35051	1.789714	2.934325	0.230579	331.989	111.8873

**Table 3.** Unit root test results

Series	Levels		First difference		Order of integration
	Test statistic	Critical value	Test statistic	Critical value	
fune	-2.232076	-2.948404	-5.280851	-2.951125	I(1)
gdp	-4.88785	-2.948404	NA		I(0)
*lapp	0.388534	-1.951000	-2.327174	-1.9151000	I(1)
pop	-4.537404	-2.976263	NA		I(0)
mune	-2.269470	-2.948404	-5.336026	-2.951125	I(1)
unem	4.510448	-2.948404	-3.387265	-2.951125	I(1)
yune	-2.223579	-2.948404	-5.263642	-2.951125	I(1)

Note: NA denotes Not Applicable. Level of significance = 0.05. \* denotes test run at no intercept or trend. All other tests were run at intercept only.



**Table 4.** ARDL estimates (short-run only)

Variable	Coeff.	Std. Err	t-stat	Prob
C	758.555341*	202.028742	3.754690	0.0010
Unem	0.476282*	0.158704	3.001067	0.0062
Lapp	-2376.7517*	583.760606	-4.071449	0.0004
popg	-5.784100	18.531687	-0.312119	0.7576
fune	93.594953*	31.650984	2.957095	0.0069
mune	20.855107	24.306015	0.858022	0.3994
yune	-82.172947*	25.108402	-3.272727	0.0032

Note: \* denotes significance at 0.05.

explaining the negative relationship between this ratio and the GDP growth rate. The population growth rate variable has a negatively significant relationship with the country's growth rate. This explains that as the country grows in population by 1%, GDP growth rate would fall by an estimated 5.78%. This was found to be significant at 0.05. Female and male unemployment were respectively found to be positively related to the GDP growth rate of the country, but the male was found to be insignificant at 5%. Youth unemployment, though, was particularly found to negatively and significantly influence GDP growth rate in Nigeria. This underscores the importance of youth in the economic growth of a nation. It thus means that GDP growth rate is expected to fall if youth unemployment rises.

The long-run results in Table 5 show that previous values of GDP growth rate significantly influence its current value. Moreover, it was found that labor force as a ratio of population, female unemployment rate, and youth unemployment rate all negatively and significantly contribute to GDP growth rate in Nigeria, tested at the 0.05 level of significance. Although in the long run, male unemployment is estimated to positively and significantly influence GDP growth rate.

**Table 5.** ARDL estimates (long-run only)

Variable	Coeff.	Std. err.	t-stat.	p-value
$d(gdpg(-1))$	0.322703*	0.154494	2.088774	0.0475
$d(unem)$	-0.402065	0.568074	-0.707769	0.4859
$d(lapp)$	-3770.316818*	1016.957090	-3.707449	0.0011
$d(popg)$	-9.175503	29.261438	-0.313570	0.7566
$d(fune)$	148.472654*	55.250747	2.687252	0.0129
$d(mune)$	33.083120	38.319300	0.863354	0.3965
$d(yune)$	-130.353561*	43.531732	-2.994449	0.0063
$CointEq(-1)$	-0.586332*	0.237145	-6.689296	0.0000

Note: \* significant at 0.05.

## 5.1. Bound test for cointegration

The bound test, as pre-explained, would verify the long-run status of the model. This test applies to the ARDL model; thus, its result is summarized and tabulated, while the decision is made about the null hypothesis of no cointegration.

**Table 6.** Bound test result

Test statistic	Critical value	K
F-statistic	4.375308*	6
Significance	I0 bound	I1 bound
10%	2.12	3.23
5%	2.45	3.61
2.5%	2.75	3.99
1%	3.15	4.43

Note: \* denotes significance at 5% level of significance.

A look at Table 6 reveals that the test statistic for the bounds test is 4.375308, which is greater than 3.61 (upper bound). Thus, the decision is to reject the null hypothesis of no cointegration and conclude that the model variables are co-integrated in the long run.

**Table 7.** Diagnostic tests

<b>Breusch Godfrey Serial Correlation Lagrange Multiplier Test:</b>		
<b>Estimators</b>	<b>Test statistics</b>	<b>p-value</b>
F-statistic	0.379106	0.5441
Observed $R^2$	0.551330	0.4578
<b>Breusch Pagan and Godfrey Heteroscedasticity Test:</b>		
<b>Estimators</b>	<b>Test statistics</b>	<b>p-value</b>
F-statistic	1.046149	0.4344
Observed $R^2$	9.580082	0.3855

The test for serial correlation in Table 7 is used as explained to verify if the model residuals are correlated for different periods. The assumption is that residuals are not correlated for subsequent periods making us not reject the null hypothesis of no autocorrelation. The result above shows that the  $p$ -value of the observed coefficient of determination for the BG LM test is greater than the 0.05 level of significance, implying no autocorrelation in the model. The model is also subjected to the test for heteroscedasticity to verify where there is a constant variance of the residual to validate the assumption of homoscedastic residuals. The result of the B-P-G test for heteroscedasticity confirms that the model residuals are homoscedastic. The diagnostic test results largely show that the assumptions underlying the applied regression models are not violated, therefore, proving the validity and reliability of the estimates.

## 5.2. Error correction representation

The estimated ECM is presented in the lower part of Table 7. The coefficient of the error correction

term is negatively significant, confirming the presence of a long-run relationship. As the estimated coefficient of the error correction term is negatively significant ( $-0.57$ ), there is convergence equilibrium by economic growth to short-run deviation arising from the unemployment variables. Therefore, one can argue that economic growth returns to its equilibrium value, with about 57% of the adjustment made within a year. This further exposes the temporal relationship between unemployment and economic growth.

In specific terms, the following are the findings arising from this study:

- That unemployment positively and significantly influences GDP growth rate in Nigeria.
- That youth unemployment in Nigeria negatively and significantly influences GDP.
- That female unemployment in Nigeria positively and significantly influences GDP growth rate.
- That male unemployment does not have any significant effect on GDP growth rate in Nigeria.

In sum, in the long run, the significant variables influencing GDP growth rate within the context of this study include unemployment rate, the ratio of labor force size to the national population, female unemployment rate, and youth unemployment rate.

## CONCLUSION

This study was motivated by the need to establish a relationship between unemployment and economic growth from a gender-based perspective. It is a departure from prior studies on unemployment-growth linkage from an absolute perspective. In this study, a battery of econometric methods was employed, focusing on the Nigerian economy, which prompts new findings. Unemployment was found to positively influence GDP growth rate. This means that increase in unemployment would increase the GDP growth rate. Though this finding appears counterintuitive and anti-theoretical, it tends to reflect the peculiarity of the unemployment problem in Nigeria. Nigeria's economy grows due to oil trade, but not many Nigerians are employed in the oil sector. The overdependence on the oil sector of the economy, which cannot be disputed as a strong revenue source, has produced growth in the face of grave neglect of the agricultural and other real sectors that create jobs. This undoubtedly has created a situation that seems to defy the set economic position on growth and unemployment nexus.

More than that, the issue of gender-based unemployment was brought to the fore by showing GDP growth rate as a positively significant function of female unemployment. This goes to lend credence to the gender discrimination that tends to characterize economic engagements in the productive sector. Though women are found to be economically active; however, in Nigeria, they have largely been confined to the informal sector, which has overly been neglected and hardly mainstreamed. Youth unemployment, on the other hand, was found to negatively and significantly influence economic growth. This implies that as more youths become unemployed, economic growth measured by the country's GDP continues to fall. The ravaging effect of youth unemployment on the productive capacity of the Nigerian economy is huge.

By way of policy implication, the government should incentivize female employment in specific sectors of the economy. This would guarantee an even distribution of job opportunities to ensure gender inclusiveness in Nigeria. This should be driven in formal and frontline sectors of the economy in line with several advocacies for women empowerment. The study advocates for an increase in government capital expenditure as this is theoretically and practically known to create new jobs. This spending should go into real and core productive sectors that could create upstream and downstream jobs opportunities. In fact, this study is expected to present a ground for discussing the unemployment-growth nexus in an economy with differing characteristics from the developed ones. A greater stretch of this area of study would mean studying the unemployment-growth linkage in economic blocs and regions such as Sub-Saharan African countries to expose its cross country dimensions.

## AUTHOR CONTRIBUTIONS

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