UNEMPLOYMENT AND ECONOMIC GROWTH IN NIGERIA: DOES OKUN'S LAW MATTERS?

Oluwaseyi Adedayo Adelowokan
PhD, Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Ogun State,
e-mail: seyiadelowokan@gmail.com, orcid.org/0000-0001-7825-1553, Nigeria
Adeteji Olusegun Okutimiren
Department of Economics, Olabisi Onabanjo University, Ago-Iwoye, Ogun State,
e-mail: seyiadelowokan@gmail.com, orcid.org/0000-0003-4965-3072, Nigeria

Abstract. The situation in Nigeria is rapid population growth with high level of unemployment rate. The theoretical proposition of the Okun's law suggests an indirect relationship existing between unemployment and output growth. This study tests the validity of Okun's law by examining the impact of youth employment generation on sustainable growth in the Nigerian economy. We modeled real gross domestic product against unemployment rate, population growth, labour and government expenditure between 1986 and 2017. The empirical findings show that there is short- and long- run relationship existing between unemployment rate, population growth and output growth in Nigeria. Hence, study recommends that the activities by the government in promoting economic growth in the country should be geared towards promoting employment for the people in other sector.

Keywords: Economic Growth, Okun's law, population, unemployment, error correction model.

DOI: http://dx.doi.org/10.23856/3203

Introduction

Nearly all developing economies is suffering from population explosion since their respective independence resulting from high fertility rates, and quadrupling their population over the years in which Nigeria is not exempted. At the same time, employment watershed has developed apparently in different forms of underemployment instead of open employment, which had been the major challenges of the developing economies as a result of their increasing population. The issue is whether adequate employment job opportunity can certainly be created to absorb the country's increasing pool of unemployed youths and if this may happen quickly which has been a serious concern to the people, policymakers, authorities along with other experts in developing economies.

Furthermore, the less developed countries are confronted with high level of unemployment and geometric increase in human population over the years. It is a generally accepted economically that the output growth rate of an economy increases employment and reduces unemployment. The theoretical proposition connecting output with unemployment happens to be proposed by Okun *(1962)* which is one of the popular macroeconomics theories. The hypothesis was basically discovered to hold for countries and regions in the developing countries *(Christopoulos, 2004; Daniels & Ejara, 2009).*

The proposition of an indirect relationship between unemployment rate and the real output growth can be traced to the novelty assertion of Okun *(1962)*. He emphasized that as a result of changes in aggregate demand, industry changes their production pattern which leads

to changes in demand for labour which alter the unemployment rates. This study therefore aims at examining the effect of unemployment on economic growth in Nigeria. The remaining part of this paper is organized as follows: section 2 provides review of literature. Section 3 presents the analytical framework and methodology adopted in the paper. Section 4 presents the empirical results and section 5 concludes the paper.

Literature Review

The following economic problems like open unemployment, underemployment, low wage employment, social exclusion, idleness etc. are recognizable in virtually every market economy nowadays. Most of them are much more severe in the less developed countries when compared to the developed nations around the world. Placing comments on the problem of lack of employment in Cameroun and Ethiopia, Australia *(2004)* opined that "unemployment remains high among youth, and it has continue to increase by the mismatch between vocational training programs and the occupation requirements of the overall economy. The lack of employment manifests per se primarily through underemployment while open unemployment is condensed in the metropolitan areas. As reported by the International Labour Organization, "unemployment is the share of labour force without work but available for and seeking employment". The people who are able and motivated to work cannot find jobs at the existing wage rates makes up a significant share in the developing countries.

The rate of unemployment in Nigeria is among the most fundamental problems the economy is struggling with at present. For instance, numerous years of corruption, civil conflict, military rule as well as abuse of office by the political class have slowed down the economic growth of the Nigerian economy. Despite the country' endowment in both human and material resources, the numerous years of misconduct and weak government policies have resulted in the underutilization of these resources. As shown by Olueye *(2006)*, the classical school argued that job losses are in existence whenever unions keep up wages above their equilibrium levels. However, the Keynesian employment theory postulated by Keynes in 1936 provided contrary argument to the classical thought that capitalism basically does not possess any kind of mechanism effective at ensuring full employment. He further showed that economic variations must not be linked solely with external factors like wars, drought and related irregularities.

Arthur Okun *(1962)* was the very first economist that analyzed the empirical relationship between unemployment and economic growth. He found that a 1% rise in the growth rate above the trend rate of growth will result simply to 0.3% in the decrease of unemployment. This relationship suggests that the speed of GDP growth will have to be at par with its potential growth simply to always keep the unemployment rate constant *(Tatom, 1978)*. Okun's coefficients can adjust as time passes simply because the level of association of unemployment to with economic growth is dependent upon legal guidelines, technological innovation, preferences, societal beliefs, and even demographics.

The results of Walterskirchen *(1999)* provided contrary findings that there exist no indirect relationship between economic growth and unemployment because both output and unemployment rises in the long run. The author support his argument that employment level can only increase if output rise faster than productivity. Specifically, the higher the total amount of goods and services generated in an economy, labour requirements for production will increase since both employment and growth move in the same direction. Similarly,

Oluyomi & Ogunrinola *(2011)* found a direct and significant relationship between unemployment and the real GDP in the Nigerian economy.

On the contrary, Obadan and Odusola *(2010)* discovered that the relationship between output growth and unemployment is inversely related for different sectors in Nigeria. They further argued that economic growth react to unemployment differently in the midst of different sectors of the economy, however, this cannot be generalized with respect to Okun's law due the prejudiced view that failed to capture the whole of unemployment rate of the total workforce of the Nigerian economy. Among the scholar that found support for Okun's law in Nigeria are Asoluka and Okezie *(2011)*, Stephen *(2012)* and Kemi and Dayo *(2014)* among others. Specifically, Asoluka and Okezie *(2011)* revealed that unemployment and output are inverse related in Nigeria for the period of 1985-2009. While investigating the effects of unemployment on economic growth in Nigeria within the periods 1980-2008, Stephen *(2012)* found that indirect relationship between unemployment and economic growth. In the same way, Kemi and Dayo *(2014)* found that there exists a relationship between output and unemployment both in short- and long- run in Nigeria.

The study conducted by Arewa and Nwakanma *(2012)* using the first difference and output gap models of Okun's law on the relationship between economic growth and unemployment rate found no support for Okun's law in Nigeria. Maku and Alimi *(2018)* employed the theoretical framework of Okun's law to investigate the efficacy of fiscal policy in employment creation in Nigeria within the period of 1980-2015. Employing ordinary least square approach after testing the stationarity level of their datasets, they found validity for Okun's law from the manufacturing sector as its output growth negatively relate with unemployment rate. The study further report a direct relationship between government spending and unemployment implying that government spending can only ensure more job creation if expended on appropriate projects capable of facilitating new employment.

Methodology

Theoretical Framework

Okun *(1962)* postulated that unemployment rate will fall by 0.3% as a result of a 1% rise in the output growth higher than the trend rate of growth. Examining the causal relationship in complete opposite, a 1% rise in unemployment means that approximately 3% or more reduction in GDP growth. This relationship suggests that the rate of GDP growth has to be at least equal to its actual possible growth in order to maintain the unemployment rate at constant level. The initial form of the Okun's law can be written as the Gap method:

$$U_t - U_t^* = b(y_t - y_t^*) \quad (1)$$

Where; y_t = real output product (GDP); y_t^* = potential output; U_t = natural level of unemployment; U_t^* = potential unemployment; and b = Okun's coefficient.

The above equation suggests that the alternation in unemployment (unemployment in current period t minus unemployment in previous period ($t - 1$) is equivalent to a negative parameter, which happens to be less than 1, demonstrates the responsiveness of unemployment to output, multiplied by the variance between output growth in current period t and the standard growth rate of output ($t - 1$). The parameter is negative simply because it is demonstrating that each time output growth goes above the normal growth rate, then, unemployment will fall. The moment output growth is below the natural growth rate, unemployment will certainly go up. This means that any time output growth is on the regular growth rate then unemployment is going to be stable.

Model Specification

The study adapted the least-squares estimation technique in a multivariate linear regression of *(Dao, 2012)*. The adapted model is modified and stated functionally as:

$$RGDP = F\,(POPGR, UMP) \quad (2)$$

The model follows a standard growth regression form expressed as:

$$RGDP = \alpha + \beta_1 POPGR + \beta_2 UMP + \mu \quad (3)$$

The choice of control variables is informed by both theory and empirical evidence. For instance, empirical evidence shows that government expenditure (GOVEXP) causes real gross domestic product both in long run and short run *(Loizidies and Vamvoukas, 2005)*, therefore, government expenditure is included as part of independent variable. Furthermore, Wagner's law approach states that national income causes public expenditure *(Wagner, 1893)*. The study also include labour (LAB) since lower wage cost increases employment which causes output to grow during the adjustment process *(Njoku and Ihugba, 2011)*.

The set of control variables considered to augment the model are labour (LAB) and government expenditure (GOVEXP). Therefore, the empirical model for this study is specified as:

$$RGDP = \alpha + \beta_1 POPGR + \beta_2 UMP + \beta_3 LAB + \beta_4 GOVEXP + \mu \quad (4)$$

Taking logarithms of both sides of the equation, we have:

$$logRGDP = \alpha + \beta_1 POPGR + \beta_2 UMP + \beta_3 logLAB + \beta_4 logGOVEXP + \mu \quad (5)$$

Where: β_1, β_3 and $\beta_4 > 0$; $\beta_2 < 0$; RGDP = Real Gross Domestic Product; POPGR = Population Growth; UMP = Unemployment rate; LAB = Labour; GOVEXP = Government expenditure.

Data

The core variables of this study are unemployment rate, population growth and real gross domestic product (the chosen proxy for economic growth). This is a time series study thus annual time series data ranging from 1986 to 2017 were obtained on the mentioned variables from the World development Indicator (WDI).

Estimation Techniques and Procedure

The study intends examine the effect of population growth and unemployment on economic growth in Nigeria. To perform this task, the estimation procedure involves some pre-tests such as descriptive statistics, unit root and cointegration test follows by the model estimation to ascertain the robustness of the study.

Stationarity (Unit root) Test

A variable is said to contain a unit root or I (1) if it is non-stationary. The use of data characterized by unit root may lead to serious error in statistical inference.

$$Y_t = \beta Y_{t-1} + \varepsilon_t \quad (6)$$

In the equation above, if β equals 1, the empirical model is said to be characterized by unit root. For the series to be stationary, β must be lower than 1 in absolute value. Hence, the

stationarity ranges between -1 and 1 (i.e. -1<β < 1) *(Vaura et al, 2005)*. An augmented Dickey–Fuller test (ADF) determines the order of integration of the series which is the number of times a series has to be differenced for it to become stationary.

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \sum_{i=1}^{k} \rho_i \Delta Y_{t-1} + \varepsilon_t \quad (7)$$

where ΔY is the time series, Δ is the first difference operator, $\mathcal{E}_t$ is the disturbance term with zero mean and constant variance, and β_1, β_2 (i = 1, …, ρ) are parameters to be estimated. The non-rejection of the null hypothesis implies that there is non-stationarity. In this case differences are necessary to reach stationarity. The regression will provide a *t*-statistic of the estimated parameter δ.

Cointegration Test

The co-integration analysis is connected with the existence of a stable relationship among variables of interest. Different series are said to be co-integrated when there exist a long-run linear relation among them *(Engle & Granger, 1987)*. On the other hand, co-integration enhances the authenticity of research findings as it allows its dealing with time series data just to avoid spurious results. For example, Johansen *(1988)* and Johansen and Juselius *(1990)*, developed a multivariate co-integration method that allow a robust procedure for testing long run relationship between stationary variables as well as the multiple co-integrating vectors. They further construct a likelihood ratio (LR) test (test statistic) to determine the number of co-integrating vectors in a co-integration regression. And, the trace tests with a null hypothesis of *r* co-integrating vectors, where *r* = 0, 1, 2….*n*–1, it is calculated as:

$$LRtr(^{r}/_{n}) = -\mathrm{T} \sum_{r+1}^{k} \log(1-\lambda) \quad (8)$$

Where: *n* is the number of variables in the system, λ – max eigen value, *T* – sample size. The decisive factor for selection is that the trace statistical value is greater than the critical value at 5% level of significant, then the null hypothesis of no cointegration i.e. r = 0 is rejected.

Vector Error Correction Model (VECM)

The vector autoregressive (VAR) model describes the dynamic interrelationship among stationary variables. A vector error correction model (VECM) evaluates the short-run properties of a cointegrated series and also quantifies the rate of adjustment across macro variables in the long run. Hendy and Juselius *(2000)* noted that the estimator is carried out when the variables are stationary at first difference and co-integrated. If variables are co-integrated, it confirms the existence of long-run relationship. The evaluation of short-run relationship is done using VECM. The regression equation form for VECM is as follows:

$$\Delta Y_t = \alpha_1 + p_1 e_1 + \sum_{i=0}^{n} \beta_i \Delta Y_{t-1} + \sum_{i=0}^{n} \delta_i \Delta Y_{t-i} + + \sum_{i=0}^{n} \gamma_i Z_{t-i} \quad (9)$$

$$\Delta Y_t = \alpha_2 + p_2 e_{i-1} + \sum_{i=0}^{n} \beta_i Y_{t-i} + \sum_{i=0}^{n} \delta_i \Delta X_{t-i} + + \sum_{i=0}^{n} \gamma_i Z_{t-i} \quad (10)$$

Empirical Results and Discussion

Table 1 presents a descriptive statistics on all the variables of interest. The maximum log (RGDP) 13.89 percent, UMP 23.90 percent, POPGR 2.69 percent, log (LAB) 17.90 and log (GOVEXP) 24.23 were recorded. Apart from the first moment statistics of the series, the

results of other statistics are also evident from the table. For instance, Jarque-Bera which measures whether the series is normally distributed or not also rejects the null hypotheses of normal distribution for all the variables and for Kurtosis, the statistics show that all the variables are platykurtic, suggesting that the distribution is flat relative to the normal. Lastly, the statistic for skewness shows that all the variables is positively skewed, implying that these distributions have long right tails.

Table 1

Descriptive Statistics

	LOG(RGDP)	UMP	POPGR	LOG(LAB)	LOG(GOVEXP)
Mean	12.95309	10.66333	2.584905	17.54739	22.37215
Median	12.74492	12.45000	2.589303	17.53521	21.41620
Maximum	13.88936	23.90000	2.692684	17.89519	24.23316
Minimum	12.22982	1.900000	2.495003	17.21754	21.10307
Std. Dev.	0.525600	6.632183	0.069995	0.201971	1.301702
Skewness	0.338328	0.175061	0.080900	0.081923	0.457519
Kurtosis	1.699685	1.730024	1.520648	1.888623	1.327627
Jarque-Bera	2.685853	2.169280	2.768327	1.419755	4.391237
Probability	0.261081	0.338023	0.250533	0.491704	0.111290
Sum	388.5927	319.9000	77.54714	473.7795	648.7925
Sum Sq. Dev.	8.011401	1275.590	0.142081	1.060597	47.44397
Observations	32	32	32	32	32

Source: Authors' computation (2019)

The correlation matrix in the table above describes the degree of association between the variables. It is assumed that two variables will be highly correlated if the correlation coefficient is greater than 0.5, or it lies between 0.3 and 0.49. Moreover, if this value lies between 0.2 and 0.29 then it is moderate correlation and if it lies 0.1 to 0.2 it is weak correlation. Thus, this result showed that there were moderate associations among all the variables.

Table 2

Results of Correlation Matrix

	LRGDP	UMP	POPGR	LLAB	LGOVEXP
LRGDP	1.000000				
UMP	0.819223	1.000000			
POPGR	0.859466	0.699189	1.000000		
LLAB	0.971550	0.853757	0.755689	1.000000	
LGOVEXP	0.940963	0.761439	0.886256	0.891671	1.000000

Source: Authors' computation (2019)

Table 3

Unit Root Test Results

Variables	Level			First Difference			Order of Integration
	None	Constant	Constant, Trend	None	Constant	Constant, Trend	
Log(RGDP)	1.7378	0.9863	-1.8627	-4.0850	-4.2881	-5.1326	I(1)
Log(GOVEXP)	1.3884	-0.4617	-1.8549	-5.1862	-5.4985	-5.4237	I(1)
Log(LAB)	1.8587	1.0275	-1.4076	-5.7648	-6.1446	-5.5845	I(1)
POPGR	0.2664	-3.8992	-1.4787	-2.3287	-2.2754	-6.5564	I(1)
UMP	-0.0389	-1.2468	-2.9390	-6.1498	-6.1446	-6.0597	I(1)

Source: Authors' computation (2019)

In the results shown in Table 3 above, the ADF test statistic for each of the variables are greater than the respective critical values. Thus, we accept the hypothesis of unit roots in each of the time series. In the final evaluation all the variables became stationary after first difference. Hence, they are integrated of order *I* (1). Once all the series are non-stationary in the level, one can estimate an econometric model only if they are co-integrated. Thus co-integration tests can be applied for all variables.

Table 4

Trace Statistic

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None *	0.885366	119.7749	51.98435	69.81889	0.0000
At most 1 *	0.705631	67.79056	29.35010	47.85613	0.0002
At most 2 *	0.603269	38.44046	22.18793	29.79707	0.0040
At most 3 *	0.341469	16.25253	10.02585	15.49471	0.0384
At most 4 *	0.228520	6.226680	6.226680	3.841466	0.0126

Source: Authors' computation (2019)

Table 5

Engel & Granger Residual Based Co-integration Test

Series	ADF	5% Critical Value	Order of Integration	Remark
Residual	-1.9550	-3.5036	I(0)	Co-integrated

Source: Authors' computation (2019)

Johansen Cointegration Test

The results in Table 5 show that there is co-integration among economic growth proxied by real gross domestic product (RGDP), unemployment rate (UMP), population growth (POPGR), labour (LAB), and government expenditure (GOVEXP). Since the ADF test value for the residual is greater than the critical value, it is said to be stationary. Thus, the time series are co-integrated, implying that a long-run stable relationship exists among the variables used in this study. This means that any short-run deviation in their relationships would return to equilibrium in the long-run.

Vector Error Correction Estimates

As we have established the existence of long-run relationship among the variables, the vector error correction model (VECM) is employed to investigate both the long-run and short-run dynamic relationship between output growth and unemployment. The estimation result of the test is presented Table 6.

In Table 6, the findings revealed the error correction term (ECT) value as -2.1678. The values has a negative sign and also significant at 5% as its t-statistic value is -5.702. This implies that the finding falls within the accepted region. It further indicates that the speed of adjustment of the series from the deviation in short run towards long-run equilibrium relationship is high. As for the coefficients, the parameter estimate of unemployment was -0.0127 and its t-test value is -2.967. The implication is that unemployment is negatively and significantly related with real output growth in Nigeria with the considered periods. Likewise, the coefficient and t-test values of population growth are -7.344 and -2.338 respectively. It also indicates that population growth is negatively and significantly related with real GDP growth. The result of coefficient of determination measured by adjusted R-squared (R^2) is 0.872, implying that the variables explains 87.2% of the variations in real output growth whereas the remaining percentage (13.8%) of the variations outside the variables included in the model. The results are in tandem with past studies like Asoluka and Okezie *(2011)*, Stephen *(2012)* etc., while contradicting the results of Oluyomi and Ogunrinola *(2011)*.

Variance Decomposition Analysis Result

This study applied the variance decomposition approach to examine the relationship between output and unemployment in Nigeria within a 1-year to 10-year forecast horizons. Table 7 presents the result of the forecast error variance decompositions of the variables in this study. The table reveals that within the first year, the error variance of real output is generated exclusively by its own innovations which falls throughout the different forecast horizons. Specifically, the shocks within real output contribute about 27% of the forecast error variance. And for the its factor determinants, unemployment, population growth, labour force and government spending shocks explain 58%, 15%, 0.05% and 0.47% respectively of the forecast error variation of real output growth. Furthermore, the contributions of population growth in explaining real output growth forecast error variance has decreased during the 10-year forecast horizon while unemployment has not also been stabled.

Table 7

Variance Decomposition Analysis Result

Period	S.E.	LOG(RGDP)	UMP	POPGR	LOG(LAB)	LOG(GOVEXP)
1	0.037061	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.103638	59.28637	24.81452	15.50810	0.005648	0.385361
3	0.193900	26.66078	46.27961	26.63565	0.087972	0.335993
4	0.294456	12.45212	60.17141	27.06657	0.115823	0.194083
5	0.364047	21.43063	55.24734	23.08195	0.104162	0.135917
6	0.414231	39.08436	42.69636	17.82805	0.086010	0.305225
7	0.497627	38.55277	44.74152	16.09510	0.059600	0.551002
8	0.607971	26.57383	56.14498	16.65867	0.039929	0.582594
9	0.682984	22.69549	60.51180	16.24305	0.036447	0.513221
10	0.709316	26.75996	57.56419	15.14109	0.056686	0.478064

Source: Authors' computation (2019)

Table 6

The estimation result of the test

CointegratingEq:	CointEq1				
LOG(RGDP(-1))	1.000000				
UMP(-1)	-0.004268				
	(0.00038)				
	[-11.3065]				
POPGR(-1)	-2.714961				
	(0.13576)				
	[-19.9978]				
LOG(LAB(-1))	-1.760850				
	(0.02563)				
	[-68.7117]				
LOG(GOVEXP(-1))	0.092702				
	(0.01142)				
	[8.11961]				
C	22.81706				
Error Correction:	D(LOG(RGDP))	D(UMP)	D(POPGR)	D(LOG(LAB))	D(LOG(GOVEXP))
CointEq1	-2.167832	26.89824	-0.030002	0.003475	5.661991
	(0.38022)	(49.3362)	(0.03477)	(0.01125)	(3.25637)
	[-5.70155]	[0.54520]	[-0.86286]	[0.30875]	[1.73874]
D(LOG(RGDP(-1)))	2.027316	-51.72877	0.007621	0.007509	0.746519
	(0.40167)	(52.1198)	(0.03673)	(0.01189)	(3.44010)
	[5.04722]	[-0.99250]	[0.20749]	[0.63158]	[0.21700]
D(LOG(RGDP(-2)))	0.548226	-26.36683	0.021228	-0.001594	2.685970
	(0.36218)	(46.9961)	(0.03312)	(0.01072)	(3.10192)
	[1.51367]	[-0.56104]	[0.64092]	[-0.14866]	[0.86591]
D(UMP(-1))	-0.012955	-0.218418	1.66E-05	-0.000108	0.063023
	(0.00403)	(0.52229)	(0.00037)	(0.00012)	(0.03447)
	[-3.21852]	[-0.41819]	[0.04523]	[-0.90909]	[1.82818]
D(UMP(-2))	-0.012730	0.061895	-0.000150	8.24E-06	0.031276
	(0.00429)	(0.55677)	(0.00039)	(0.00013)	(0.03675)
	[-2.96684]	[0.11117]	[-0.38164]	[0.06491]	[0.85106]
D(POPGR(-1))	9.063795	-261.6877	1.596550	-0.142926	48.50288
	(3.81812)	(495.430)	(0.34916)	(0.11301)	(32.7002)
	[2.37389]	[-0.52820]	[4.57257]	[-1.26469]	[1.48326]
D(POPGR(-2))	-7.343824	323.7741	-0.735233	0.094672	-44.96735
	(3.14093)	(407.560)	(0.28723)	(0.09297)	(26.9005)
	[-2.33810]	[0.79442]	[-2.55973]	[1.01832]	[-1.67162]
D(LOG(LAB(-1)))	23.56257	-329.8495	-0.252772	0.651782	-139.2167
	(10.6584)	(1383.01)	(0.97469)	(0.31548)	(91.2839)
	[2.21070]	[-0.23850]	[-0.25934]	[2.06601]	[-1.52510]
D(LOG(LAB(-2)))	23.13594	-599.4492	0.278817	0.265241	-4.749920
	(12.2580)	(1590.57)	(1.12096)	(0.36282)	(104.983)
	[1.88742]	[-0.37688]	[0.24873]	[0.73105]	[-0.04524]
D(LOG(GOVEXP(-1)))	0.281861	-3.751515	0.004240	0.005289	-1.395890
	(0.06270)	(8.13535)	(0.00573)	(0.00186)	(0.53696)
	[4.49564]	[-0.46114]	[0.73959]	[2.85011]	[-2.59960]
D(LOG(GOVEXP(-2)))	0.137673	-3.135737	0.005206	0.000709	-0.264577
	(0.07869)	(10.2103)	(0.00720)	(0.00233)	(0.67392)
	[1.74963]	[-0.30712]	[0.72352]	[0.30445]	[-0.39260]
C	-1.359214	30.30496	-0.003220	0.001624	3.704554
	(0.28496)	(36.9762)	(0.02606)	(0.00843)	(2.44057)
	[-4.76978]	[0.81958]	[-0.12356]	[0.19251]	[1.51791]
R-squared	0.872056	0.208124	0.971506	0.945986	0.704749
Adj. R-squared	0.744112	-0.583751	0.943013	0.891973	0.409498
Sum sq. resids	0.015108	254.3794	0.000126	1.32E-05	1.108203
S.E. equation	0.037061	4.808887	0.003389	0.001097	0.317405
F-statistic	6.815928	0.262825	34.09569	17.51384	2.386947
Log likelihood	51.63646	-60.27391	106.6522	132.5968	2.241085
Akaike AIC	-3.446649	6.284688	-8.230626	-10.48668	0.848601
Schwarz SC	-2.854217	6.877120	-7.638194	-9.894246	1.441033
Mean dependent	0.052261	0.643478	0.004871	0.025951	0.118099
S.D. dependent	0.073263	3.821212	0.014197	0.003338	0.413050

Impulse Response Functions Test Results

In this sub-section, we used the impulse response functions (IRF) to reveal the dynamic effects of output growth shocks on the unemployment in Nigeria as well as other factors like population, labour and government expenditure. This was examined over a ten-year forecast horizon. The results is presented in Figure 1. The result shows that the shock in unemployment, population growth and real output respond positively while the impact of the shocks to both unemployment and population die down rapidly. However, the shocks to labour and government spending die out which goes in tandem with the central authority's strategy to reduce unemployment rate.

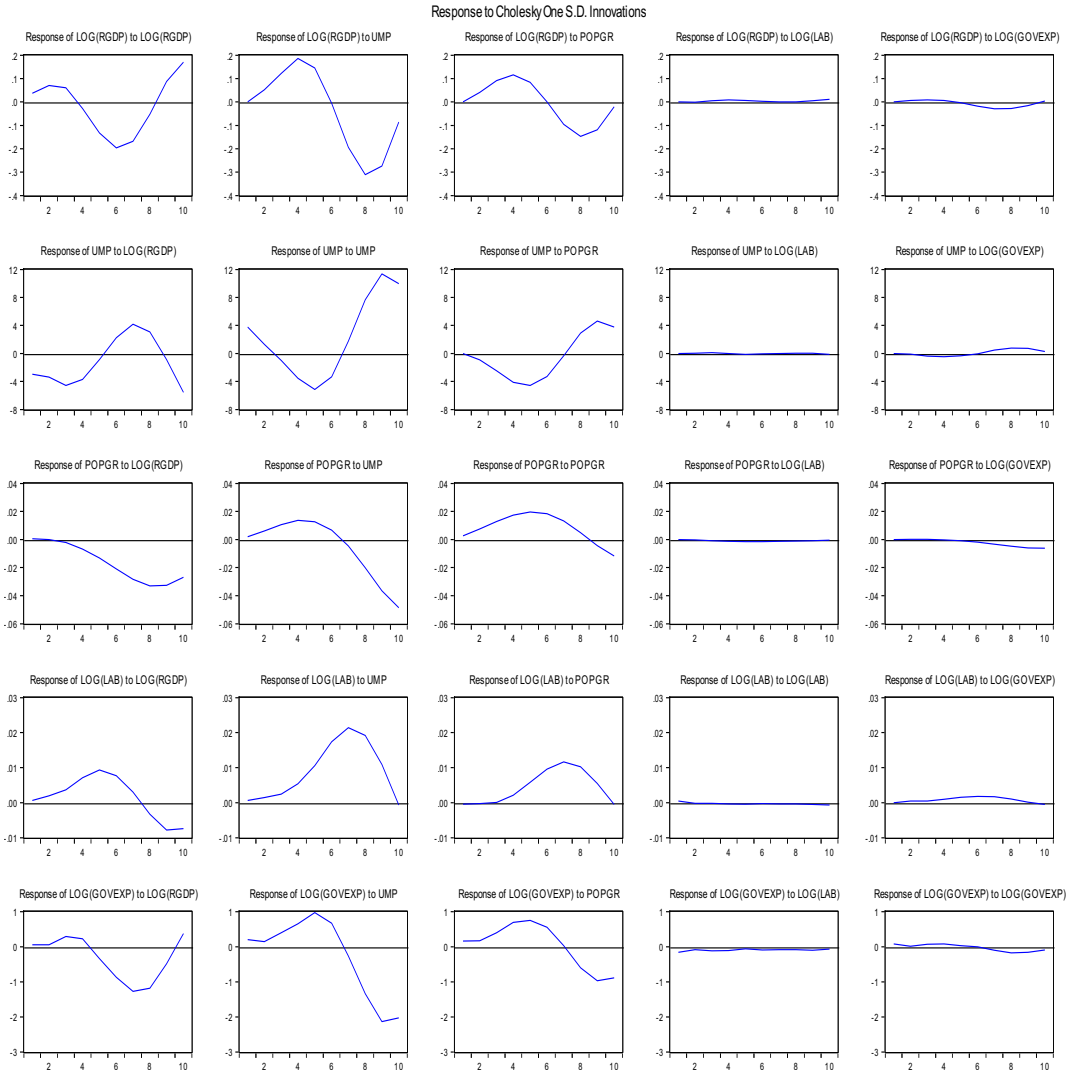

Fig. 1. Impulse Response Functions (IRF) Test Results

Conclusion

This study examined the effect of unemployment on output growth in Nigeria using annual time series data that spanned within the period of 1986 – 2017. The impulse response functions revealed that when there is a shock to unemployment rate or population growth, output responds positively, but the impact of the shock later dies down rapidly in the following years. The variance decomposition (VD) analysis showed that at a ten-year forecasting horizon, unemployment rate and population growth shocks explain 58% and 15% respectively of the forecast error variance of output.

Also, this study found out that Okun's law is not valid in Nigeria. The economic situation is such that indicates a high growth rate and a high unemployment level as seen from the country's over dependence on oil as its major source of revenue. A few proportion of the country labour force is captured in this sector thereby promoting the economy with its high unemployment growth. The nation is characterized with high level of unemployment alongside with economic growth. Thus Okun's law does not hold for Nigeria. The results obtained in this study are in conformity with the one conducted by Arewa & Nwakanma *(2012)*.

These findings have significant implications for development programmes and policies introduced by the government of Nigeria which does not aim at declining unemployment rates but increasing growth rates. It was clearly seen that while unemployment was increasing, the economy was equally growing along with population size. This is as a result of over dependence on oil as a major source of revenue to the nation. Hence, this study recommends that activities by the government in promoting economic growth in the country should be geared towards promoting employment for the people in other sector.

References

Arewa, A., & Nwakanma, P. (2012). Potential-real GDP and Growth Process of Nigerian Economy, An Empirical Re-evaluation of Okun's Law, European Scientific Journal, 8(9), 25-33. [in English].

Bloom, D. (1986). Economic Development and the Timing and Components of Population Growth. Journal of Policy Modeling, 10: 57-81. [in English].

Christopoulos, D. (2004). The Relationship between Output and Unemployment: Evidence from Greek Regions Study, Regional Science, 83: 611-620. [in English].

Daniel, K., & Ejara, D. (2009). Impact of Information Asymmetry on Municipal Bond Yields: An Empirical Analysis. Am. J. Econ. Bus. Admin, 1: 11-20. [in English].

Dao, M. (2012). Population and Economic Growth in Developing Countries. International Journal of Academic Research in Business and Social Sciences, 2 (1), 6-17. [in English].

Ehrlich, P. (1968).Population Control or Race Oblivion? The Population Bomb. New York: Ballantine Books. [in English].

Engel, R., & Granger, W. (1987). Cointegration and Error Correction: Re-presentation, Estimation and Testing. Econometrica, 55(2), 251–276. [in English].

Hoover, E. (1958) Population Growth and Economic Development in Low Income Countries. Princeton, New Jersey, Princeton University Press. [in English].

Johansen, S. (1988). Statistical Analysis of Cointegration Vectors. Journal of Economic Dynamics and Control, 12 (2-3), 231-254. [in English].

Johansen, S., & Juselius, K. (1990). Maximum Likelihood Estimation and Inference on Cointegration with Applications to the Demand for Money. Oxford Bulletin of Economics and Statistics, 52 (2), 169-210. [in English].
Kelley, A. (1988). Economic Consequence of Population Change in the Third World Countries. Journal of Economic Literature, 26(4), 685-728. [in English].
Kelley, A. (2001). The Population Debate in Historical Perspective: Revisionism revised. Oxford University Press. [in English].
Keynes, J. (1936). The General Theory of Employment, Interest and Money. London: Macmillan. [in English].
Loizidies, J., & Vamvoukas, G. (2005). Government Expenditure and Economic Growth: Evidence from Trivariate Causality Testing, Journal of Applied Econometrics 8: 125. [in English].
Maku, E. O., & Alimi, O. Y. (2018). Fiscal Policy Tools, Employment Generation and Sustainable Development in Nigeria. Acta Universitatis Danubius Economica, 14(3), 186-199. [in English].
Njoku, A., & O. Ihugba (2011). Unemployment and Nigerian Economic Growth (1985-2009). Proceeding of the 2011 International Conference on Teaching, Learning and Change. International Association for Teaching and Learning (IATEL). [in English].
Obadan, M., & Odusola, F. (2010). Productivity and Unemployment. Ibadan: National Center for Economics Management and Administration. [in English].
Okun, A. (1962). Potential GNP: Its Measurement and Significance, Cowles Foundation Paper, 190, 1–7. [in English].
Oluyomi, A., & Ogunrinola, O. (2011). Employment and Economic Growth Nexus in Nigeria, International Journal of Business and Social Sciences, 2 (11), 12-17. [in English].
Walterskirchen, E. (1999). The Relationship between Growth, Employment and Unemployment in the EU European Economists for an Alternative Economic Policy (TSERNETWORK). Workshop in Barcelona, 16 to 18 September. [in English].
Warner, A. M. (1995). Natural Resource Abundance and Economic Growth. NBER Working Paper No: 5398. [in English].