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The Effects of some Major Macroeconomic Variables on Unemployment Rate in Nigeria: A Bounds Test Approach

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Keywords: unemployment rate, gdp, treasury bill, inflation rate, cointegration, granger non-causality.

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THEEFFECTSOFSOMEMAJORMACROECONOMICVARIABLESONUNEMPLOYMENTRATEINNIGERIAABOUNDSTESTAPPROACH

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The Effects of some Major Macroeconomic Variables on Unemployment Rate in Nigeria: A Bounds Test Approach

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I. Introduction

Unemployment is a problem in almost all countries of the world both in industrially advanced as well as poor countries. During the period of recession, an economy usually experiences a relatively high unemployment rate. There remains considerable theoretical debate regarding the causes, consequences, and solutions for unemployment. According to World Bank report (1994), deficiency in the labor market, deepening poverty, and widespread indecent standard of living are associated with high unemployment rates. Nigeria being part of the global community has its share of the effects of unemployment as it has been on a steady rise in the recent past. In Nigeria, the unemployment rate is the proportion of those who are looking for work but could not find for 40 hours or more during the a particular period to the total number employed in the labor force. The issue of unemployment in Nigeria is peculiar. This may be associated with high level of corruption, mismanagement of public funds, among others over the years. Interestingly, every government regime comes with its own economic growth increase strategy, but none has been able to achieve the desired goal. Since the continuous increase in population begun, developing nations have been characterized by unemployment. The issue of unemployment brought about some social and economic consequences such as; increase in crime rate, loss of respect and identity, reduction in purchasing power, psychological injuries, corruption, among others. Various programs such as the Youth Empowerment Program (YEP) and National Economic Empowerment Programs (NEEDS) were established to reduce the rate of unemployment in the country, but the issue of unemployment remains unchanged as observed in some studies in the 21st century. This study aims at investigating the effects of some selected macroeconomic variables such as interest rate, Gross Domestic Product (GDP), and inflation rate on unemployment in Nigeria.

a) Related works

Anthony-Orji and Okafor (2015) investigated Inflation and Unemployment nexus in Nigeria by testing if the Original Phillips curve proposition holds for Nigeria. The study adopted a distributed lag model with data covering the period 1970-2011. The result of the study establishes a positively significant relationship between inflation and unemployment rate in Nigeria which negates the original proposition on the Phillips curve hypothesis in Nigeria. Similarly, Lee (2000) conducted a study using the Okun's equation to study the relationship unemployment growth and the economy and concluded there is no stable relationship for all OECD countries. However, the study emphasized that impact of growth on employment remain valid. Ademola and Badiru (2016) investigate and determine the effects of unemployment and economic performance in Nigeria between the periods 1981 to 2014. Ordinary Least Square (OLS) technique was adopted with a various diagnostic tests to determine how fit are the data for the

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analysis. The result found that the unemployment rate and inflation rate are positively related to economic growth. The positive relationship indicates that Nigeria's GDP is driven by oil revenue that employs very limited highly skilled labor, and the price of crude oil is determined externally, which may not respond as expected to growth of the country's GDP. In testing the validity of Okun's law in Nigeria, Akeju and Olanipekun (2014) examined the cointegration between the unemployment rate and economic growth using Johansen cointegration test amongst the variables employed in the study. Empirical findings show that there is both the short and the long-run relationships among the variables and are positively related; hence, the need to incorporate fiscal measures and increase the attraction of foreign direct investment (FDI) to reduce the high rate of unemployment in Nigeria. Umaru and Zubairu (2012) investigated the relationship between unemployment, interest rate, and inflation in the Nigerian economy from 1977 – 2009. They used the following; pre-test Augmented Dickey-Fuller unit root to test the stationary of all the variables, cointegration test was conducted through the application of Johansen cointegration technique to examine the long-run relationship between the two phenomena. Holden and Sparman (2013) examined the effect of government purchases on unemployment in 20 OECD countries for the period 1980 to 2007. They observed that a one percent increase in government purchases of GDP reduced unemployment by about 0.3 percent in the same year. The effect was seen to be higher in downturns than in booms, and also under a fixed exchange rate regime than a floating regime. Onwanchukwu (2015) examined the impact of unemployment on the economic growth in Nigeria from 1985 to 2010, using ordinary least squares regression technique. His findings revealed that unemployment does not have a significant impact on the economic growth of Nigeria. Inflation, however, was found to have significant impact on the economic growth of Nigeria.

Airi Ounakpo & Anebi-Atede (2016) investigate the impact of unemployment on the Nigeria economy (1980-2010). By adopting the Ordinary Least Square Regression (OLS), the findings showed that unemployment hurts the Gross Domestic Product (GDP) of the Nigeria economy. Sansui Yahaya Enejoh et al. (2016) carried out an analytical study of the Impact of unemployment on economic growth in Nigeria using a time series data from 1970 to 2016. Granger causality reveal that there exist both unidirectional and directional causality between unemployment and economic growth in Nigeria. The result shows that there is a long run relationship between unemployment and economic growth in Nigeria. Muhammad (2014) studied the effect of inflation and unemployment on the growth of Pakistan from 1980 to 2010 using the Auto regressive distributed lag. At first, the study noted that the inflation effect varies from economy to economy, but most of the studies show that there is a positive relationship between inflation and economic growth or GDP. The result showed that there is a long-run relationship between the variables. Mohammed, Okoroafor, and Awe (2015) analyzed the relationship between unemployment, inflation, and economic growth in Nigeria from 1987-2012. Using Ordinary Least Square method of estimating model parameters, the study shows that interest rate and total public expenditure have significant impact on economic growth in Nigeria, while inflation and unemployment has inverse effects on growth in Nigeria. Imran and Iba (2014) examine the relationship between macroeconomic variables and unemployment in Pakistan from 1980-2010 using the VAR Approach. The study shows that the variables have more internal variability when compared to other variables. Madito and Khumalo (2014) examined unemployment nexus in South-Africa from 1971Q1 to 2013Q4 using the Error correction mechanism as a result of the dynamic inter-relationship between the variables used to check the speed of adjustment of economic growth to the unemployment crisis. The research work reveled that about 62 percent of economic growth is corrected each quarter. The overall results showed that there is a negative relationship between economic growth and unemployment in South Africa. Using the first difference and output-gap models of Okun's law, Arewa and Nwakanma (2012) conducted an empirical evaluation of the relation between output and unemployment. The study finds no evidence to support the validity of Okun's law, which states that when unemployment falls by 1%, GDP rises by 3% in Nigeria. Torruam and Abu (2014) examined the causal relationship between unemployment, inflation, and crime in Nigeria for the period 1980-2011. The following tests were conducted: unit root test cointegration test which was used to test for stationarity the long-run relationship among the variables respectively. Granger-causality suggested that there is unidirectional causality running from unemployment and inflation to crime in Nigeria. The study recommended that holistic effort should be made by governments at all levels to create jobs and arrest.

II. Model Setup, Estimation, and Results

This research work employed Autoregressive Distributed Lag Modeling procedure (Bounds testing) as proposed by Pesaran and Shin (1999) is used to establish a conditional unrestricted long-run level relationship between unemployment and other selected macroeconomic variables. This method performs relatively better when the sample size is small, and it is applies to a mixture of stationary and non-stationary time series, unlike Johansen's procedure, which requires the underlying variables to be integrated of the same order. Also, it allows for the inclusion of different lags of the response variable and the explanatory variables using the simple model selection methods such as Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and the Hannan-Quinn Information Criterion (HQIC). The residual normality of the variables was carried out using the Jarque-Bera and serial correlation test, while the Granger Non-Causality test proposed by Toda and Yamamoto was used in identifying the direction of the models. The data used in the research covers the span from 2006-2018 quarterly data. The data was obtained from the Central Bank of Nigeria (CBN) database, Statistical bulletin and the National Bureau of Statistics (NBS). The macroeconomic variables used for the study are the Unemployment rate, Nominal Gross Domestic Product, Interest rate, and inflation rate.

Time Plot of GDP, Treasury bill, Unemployment rate, and Inflation Rate

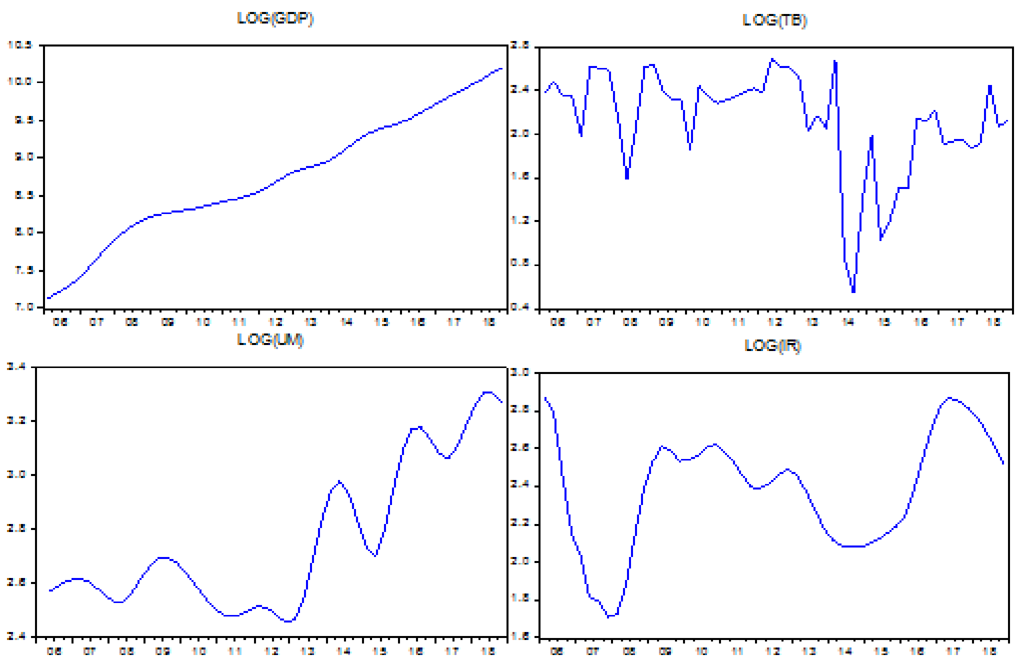


Figure 1: Log GDP, log inflation rate, log interest rate and log unemployment rate for Nigeria between 2006 and 2018

The time plot of the variables showed that variables of Inflation rate (IFR) as well as Treasury Bills (TB) were random due to their cyclical variation. Unemployment Rate (UM) and Gross Domestic Products (GDP) were found to be non-random. The non-randomness of the UM, GDP might be a result of the trend experienced in the observations of those variables, which may result in the series non-stationary. One advantage of using the ARDL methodology is that it can be applied to any series regardless of the order of the integration. Hence no unit root test was necessary. The maximum lag order for the initial VAR was done using the usual criteria of AIC, SIC, HQ, LR, FPE, as shown in Table 1 below. A maximum lag $k = 4$ was selected by these methods.

Table 1: VAR Lag Order Selection Criteria

LAG	LOGL	LR	FPE	AIC	SIC	HQ
0	-40.1183	NA	9.60E-05	2.1005	2.266	2.1612
1	201.812	426.2469	2.05E-09	-8.6577	-7.83027	-8.3544
2	302.013	157.4584	3.81E-11	-12.6672	-11.1779	-12.1213
3	414.938	155.9435	3.99E-13	-17.2827	-15.1313	-16.4941
4	446.727	37.84478*	2.10e-13*	-18.0346*	-15.2212	-17.0034*

** Selected maximum based on the information criteria*
Source: Author's computation.

When non-stationary variables are regressed in a model, we may get results that are spurious. This can be resolved by differencing the data in order to achieve stationarity of the variables. In this case, the estimates of the parameters from the regression model may be correct, and the spurious equation problem resolved. However, the regression equation only gives us the short-run relationship between the variables and no information about the long-run behavior of the parameters in the model. This constitutes a problem since researchers are mainly interested in long-run relationships between the variables under consideration, and to resolve this, the concept of co-integration and the ECM becomes imperative with the specification,

$$y_t = \beta_0 + \beta_1 y_{t-1} + \cdots + \beta_k y_{t-p} + \alpha_0 x_{t-1} + \alpha_2 x_{t-2} + \cdots + \alpha_q x_{t-q} + \varepsilon_t \quad (1.1)$$

$$\Delta y_t - \sum_{i=1}^{p} \lambda_i^* \Delta y_{t-1} + \tau^* \Delta t_t + \sum_{j=1}^{k+2} \sum_{l=0}^{p_{j-1}} \Delta z_{j,t-1}{}' \beta_{j,i} * - \widehat{\emptyset} EC_{t-1} + \varepsilon_t \quad (1.2)$$

The ARDL (p,$q_1 q_2 \ldots q_k$) model specification is given as follows;

$$\emptyset(L) y_t = \varphi + \theta_I(L) x_{1t} + \theta_2(L) x_{2t} + \theta_k(L) x_{kt} + \mu_t \quad (1.3)$$

Using the lag operator, L applied to each component of a vector,

$$L^k y = y_{t-k} \quad (1.4)$$

Is convenient to define the lag polynomial $\emptyset(L, p)$, and the vector polynomial β(L, q). As long as it can be assumed that the error term μ_t is a white noise process, or more generally, is stationary and independent of $x_t, x_{t-1}, \ldots$ and y_t, y_{t-1},the ARDL models can be estimated consistently by ordinary least squares. Consider, an ARDL (p, q) regression with an I(d) regressor,

$$y_t = \emptyset_1 y_{t-1} + \cdots + \emptyset_p y_{t-p} + \theta_0 x_t + \theta_1 x_{t-1} \ldots + q_1 x_{t-p} + u_{1t} \quad (1.5)$$

or

$$x_t = \emptyset_2 x_{t-1} + \cdots + \emptyset_p x_{t-p} + \theta_0 y_t + \theta_1 y_{t-1} \ldots + q_1 y_{t-p} + u_{2t} \quad (1.6)$$

t=1,2,…T $u_t \sim iid(0, \delta^2)$.

The ARDL (p,$q_{1,} q_2 \ldots q_k$) model approach to Cointegration testing;

$$\Delta X_t = \delta_{0i} + \sum_{i=1}^{k} \alpha_i \Delta X_{t-1} + \sum_{i=1}^{k} \alpha_2 \Delta Y_{t-1} + \delta_1 X_{t-1} + \delta_2 Y_{t-1} + v_{1t} \quad (1.7)$$

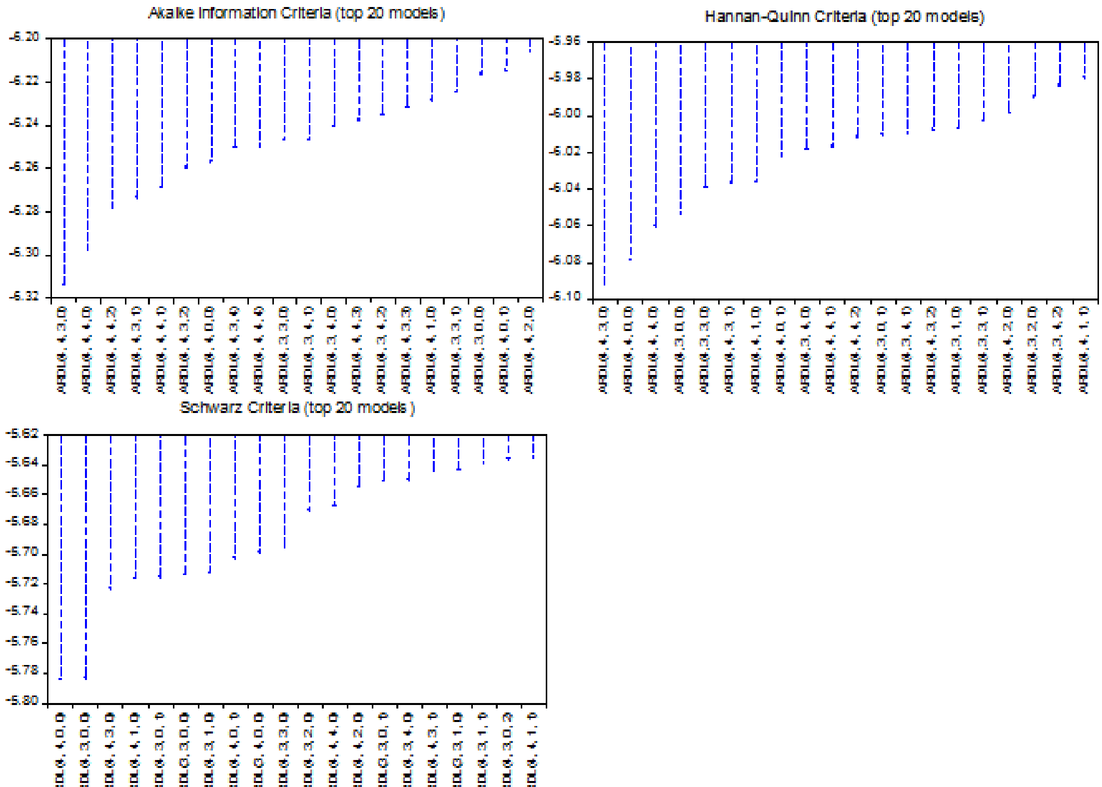
$$\Delta Y_t = \delta_{0i} + \sum_{i=1}^{k} \alpha_i \Delta Y_{t-1} + \sum_{i=1}^{k} \alpha_2 \Delta X_{t-1} + \delta_1 Y_{t-1} + \delta_2 X_{t-1} + v_{1t} \quad (1.8)$$

K is the ARDL model maximum lag order and chosen by the user. The *F*-statistic is carried out on the joint null hypothesis that the coefficients of the lagged variables ($\boldsymbol{\delta_1 X_{t-1} \delta_1 X_{t-1} or \delta_1 Y_{t-1} \delta_1 X_{t-1}}$) are zero. ($\boldsymbol{\delta_1 - \delta_2}$) Correspond to the long-run relationship, while ($\boldsymbol{\alpha_1 - \alpha_2}$) represent the short-run dynamics of the model. The hypothesis that the coefficients of the lag level variables are zero is to be tested. The null of the non-existence of the long-run relationship is defined by:

$\boldsymbol{H_0: \delta_1 = \delta_2 = 0}$ (The long-run relationship does not exist)

$\boldsymbol{H_1: \delta_1 \neq \delta_2 \neq 0}$ (The long-run relationship exist)

The hypothesis is tested by means of the *F*-statistic (Wald test). If the Wald F-Statistic falls above the critical value, we conclude that there is co-integration and if it falls below the lower critical bound value, conclude that there no co-integration. We specify a level unrestricted VAR (k) model using the information criteria to select the lag length, AIC, SIC, and HQ. Thus, we set our $k = 4$ in this project.



Source: Author's computation.

Figure 2: ARDL Lag Selection using the AIC, SIC, and HQIC model selection techniques

The AIC, SIC, and HQIC model selection give 200, 203, and 200 respectively. Figure 2 illustrates graphically, the top twenty models from the models considered based on the model selection procedures respectively, and the model with the lowest information lost was selected. Hence, the AIC, SIC and HQIC selected an ARDL (4,4,3,0), (4,4,0,0) and (4,4,3,0) respectively. Determination of the numbers of lags was done using the AIC information criterion, which selected an ARDL with four lags of the unemployment rate, four lags of Gross Domestic Product, three lags of Treasury bills, and zero lag of Inflation rate. The AIC method was chosen because of its similarity with the HQIC method since it is the best among the model selector; otherwise, the later will be preferred. The result of the bound test is presented in Table 2 below.

Table 2: The ARDL Bounds Test Result

I(0) Bound	I(1) Bound	F-Stat	*K*	Α
2.72	3.77	2.12	3	10%
3.23	4.35	2.12	3	5%
4.29	5.61	2.12	3	1%

Source: Author's computation.

A bound test was conducted to establish the existence of a conditional long-run relationship between the unemployment and the macroeconomics variables. Table 2 illustrates the result of the bound testing procedure. The F-statistic with 3-degree freedom shows that a value of 2.112 lies outside the upper and the lower bound, and this shows that there is a long-run relationship between the four variables. This result gives rise to the estimation of the conditional long-run level relationship model in equation 1.9, which determined the cointegrating equation $\boldsymbol{EC_{t-1}}$ (Table 3).

Table 3: Co-integration and Long Run Form of ARDL (4, 4, 3, 0) model

Regressors	*Coefficient*	*Std. Error*	*t-Statistic*	*p-value*
$\Delta LOG(UM)_{t-1}$	1.6929	0.1496	11.3103	0.0000*
$\Delta LOG(UM)_{t-2}$	-1.2424	0.2011	-6.1558	0.0000*
$\Delta LOG(UM)_{t-3}$	0.3641	0.1191	3.0547	0.0045*
$\Delta LOG(GDP)$	1.8315	0.5539	3.3062	0.0023*
$\Delta LOG(GDP)_{t-1}$	-8.8966	2.5569	-3.4799	0.0015*
$\Delta LOG(GDP)_{t-2}$	5.4229	1.9219	2.8224	0.0081*
$\Delta LOG(GDP)_{t-3}$	-1.169	0.6061	-1.9282	0.0627***
$\Delta LOG(TB)$	-0.0018	0.0044	-0.4141	0.6816
$\Delta LOG(TB)_{t-1}$	-0.0067	0.0041	-1.6441	0.1099
$\Delta LOG(TB)_{t-2}$	0.0089	0.0039	2.2805	0.0294**
$\Delta LOG(IR)$	0.0084	0.0115	0.7371	0.4664
EC_{t-1}	-0.0475	0.0178	-2.6677	0.0119**

,,*** test that the model is significant at 1%, 5%, and 10% level of significance, respectively.*

Source: Author's computation.

From Table 3 for the short-run dynamics, Log of UM at lag 1 has a positive effect on UM, and it is significant at all levels of significance (0.000 < 0.1), which means a percentage increase in UM will result in an increase of 1.69% on itself. At lag 2, which is also significant at all levels (0.0000 < 0.1), shows that a percentage increase in UM will bring about a decrease of 1.24% on itself. At lag 3, which is also significant at all levels (0.045 < 0.1), indicate that a percentage increase in UMR will result in an increase of 0.36% on itself. The overall conclusion here is that, at lag 1 UM as an appositive effect on itself, at lag 2, it hurts itself, which shows that as we are increasing the lags, it is changing from positive to negative and from negative to positive. The average effect shows that a percentage increase in UM will bring about an increase of 0.2715% on itself. Considering the current value of GDP which is significant at all levels (0.023 < 0.1) has a positive effect on UMR, this implies that percentage change in GDP will bring about an increase of 1.8% on UMR provided all other variables are held constant i.e., as GDP is increasing UM is increasing alongside with it. This contradicts the ideal Okun's law that 1% decrease in GDP will result in an increase of 0.3% on UMR. At lag 1, the p-value 0.015 < 0.1, which is also significant shows that a percentage increase in GDP will result in a decrease of 8.896% on UM. Moving a step backward, at lag 2, it shows that a percentage increase in GDP will result to an increase of 8.422% on UM with p-value 0.0081 < 0.1, which is also significant at 10%. At lag 3, a percentage increase in GDP will result in a decrease of 1.17% on UM with p-value 0.0627 < 0.1 which is also significant at 10%. Considering the average effect which claims that a percentage increase in GDP will result in a decrease of 1.547% on UM while other factors remain constant. The current value of TB shows that a percentage increase in TB will bring about a decrease of 0.00182% on UM with an insignificant p-value of 0.6816. Lag 1 showed that a percentage increase in TB will result in a decrease of 0.0067% on UM with an insignificant value of 0.1099. At lag 2, a percentage increase in TB will bring about an increase of 0.0089% on UM with a significant value of 0.0294. The average effect shows that a unit increase in TB will bring about an increase of 0.0005% on UMR holding other factors constant. The current value of IR, which is significant at all levels, shows that a percentage increase in IR will result in an increase of 0.0085% on UM. For the long-run dynamics, the long run coefficient $\boldsymbol{EC_{t-1}}$ is negative and lies between 0 and -1, which makes the result of existence of long run from the bound test significant because the value is less than all the critical values which makes the speed of adjustment significant. The speed of adjustment of UM to disequilibrium cause by shocks on other macroeconomic variables with coefficient of -0.0476 indicate that over 4% of the disequilibrium error in the system arising from the influence of external shocks are corrected quarterly which is slow. The GDP which is the most significance with respect to speed of adjustment -0.0476 indicate that UM react slowly to shocks on GDP and this is exactly what is happening in Nigeria, GDP is rising but it effect on UM is rarely seen, these could be to the fact that income from GDP is not well managed or being channeled wrongly in such a way that private sector can grow. The positive relationship indicates that Nigeria's GDP is driven by oil revenue that employs very limited highly skilled labor, and the price of output of crude oil is determined externally, which may not respond as expected to growth of output in the country.

$$EC_{t-1} = [\log(um)_t - 0.3122\log(gdp) - 0.0988\log(tb) + 0.1783\log(ir)] \quad (1.9)$$

(0.1047) (0.1374) (0.2207)

(2.9831) (-0.7189) (0.8079)

Note, the immediate value under each coefficient is the standard error. This model was checked for residual serial correlation and normality using the Breusch-Godfrey Lagrange Multiplier (LM) Serial correlation test and Jarque-Bera test respectively. The LM was based on computed *F*-statistic = 2.6101 (*p-value=0.0568)* and $\chi2$ (4) = 12.7652 (*p-value = 0.0125*). We could not reject the null hypothesis of no residual serial correlations at 5% and 1% levels of significance respectively. Furthermore, Jarque-Bera 0.598761 with a p-value of 0.741277 also shows that the error term is normally distributed.

a) *Granger Non-Causality*

According to Toda and Yamamoto (1995), economic series could be either integrated of the different orders or non-co –integrated or both. In this case, the ECM (Error Correction Model) cannot be applied for Granger causality test. Hence, they developed an alternative test, irrespective of whether Y_t *or* X_t are I(0). I(1) or I(2), non-co-integrated or co-integrated of arbitrary order. This is widely known as the Toda and Yamamoto Augmented Granger Causality. This procedure provides the possibility of variables based on asymptotic theory. Toda and Yamamoto Augmented Granger Causality test method is based on the following techniques.

$$Y_t = \alpha + \sum_{i=1}^{h+d}\beta_1 Y_{t-1} + \sum_{j=1}^{k+d} Y_j X_{t-j} + U_{yt} \quad (2.0)$$

$$X_t = \alpha + \sum_{i=1}^{h+d}\theta_i X_{t-1} + \sum_{j=1}^{k+d}\delta_j Y_{t-j} + U_{xt} \quad (2.1)$$

Where *d* is the maximal order of integration of the variables in the system, *h and k* are the optional lag length Y_t *and* X_t and ε_t are error terms that are assumed to be uncorrelated. The maximal order of model is determined and a VAR is constructed at levels with a total of (*k+d)* lags. Let *y* and *x* be stationary time series. The null hypothesis that *x* does not granger cause *y* can be tested by initially finding the proper lagged values of *y* to be included in a univariate autoregression of *y*:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \cdots + \alpha_m y_{t-m} + \varepsilon_t \quad (2.2)$$

Next, the auto regression is augmented by including lagged values of *x*:

$$y_t = \alpha_0 + \alpha_1 y_{t-1} + \alpha_2 y_{t-2} + \cdots + \alpha_m y_{t-m} + b_p x_{t-p} + \cdots + b_q x_{t-q} + \varepsilon_t \quad (2.3)$$

The null hypothesis that *x* does not granger cause *y* is accepted if and only if no lagged values of *x* are retained in the regression. Having established the existence of long-run relationships amongst the macroeconomic variables, we proceed to the test of granger non-causality using the Toda and Yamamoto procedure.

Table 4: VAR Granger Non-Causality/Block Exogeneity Wald Tests

LOG(UM)				LOG(GDP)			
Excluded	Chi-Sq	DF	Prob.	Excluded	Chi-Sq	DF	Prob.
$LOG(GDP)_{t-5}$	59.3166	4	0.0000	$LOG(UM)_{t-5}$	9.3042	4	0.0539
$LOG(TB)_{t-5}$	17.73649	4	0.0014	$LOG(TB)_{t-5}$	3.7576	4	0.4398
$LOG(IR)_{t-5}$	26.57274	4	0.0000	$LOG(IR)_{t-5}$	27.9166	4	0.0000
ALL	77.46377	4	0.0000	ALL	43.0115	12	0.0000
LOG(TB)				LOG(IR)			
Excluded	Chi-Sq	DF	Prob.	Excluded	Chi-Sq	DF	Prob.
$LOG(UM)_{t-5}$	11.4765	4	0.0217	$LOG(UM)_{t-5}$	14.3605	4	0.0062
$LOG(GDP)_{t-5}$	12.1679	4	0.0161	$LOG(GDP)_{t-5}$	19.8653	4	0.0005
$LOG(IR)_{t-5}$	18.5271	4	0.001	$LOG(TB)_{t-5}$	9.6539	4	0.0467
ALL	26.8767	12	0.008	ALL	23.3864	12	0.0246

Source: Author's computation.

The result above where the Unemployment rate is the dependent variable reveals that the null hypothesis that GDP, TB, and IR does not Granger cause unemployment rate is rejected at all levels of significance since all their p-values are less than 0.001,.005 and 0.1, which shows that there is causality amongst the variables. For GDP as the Dependent variable, UM and TB are significant at 1% except for TB, which is not significant at all levels because it has its p-value of 0.4398 > 0.01. For TB as a dependent variable, the null hypothesis of no granger cause is rejected because the independent variable UM, GDP, and IR has the p-value 0.0217, 0.0161, and 0.001 respectively to be less than 0.05 level of significance. For IR as dependent variables, the null hypothesis that UM, GDP and T B does not granger cause TB is rejected at 5% level of significance since the p–value 0.0062 of Um is less than 0.05, p-value 0.0005 of GDP is less than 0.05 and p-value 0.0467 is less than 0.05. The variables show both uni- and bi-directional causality.

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Table 5: Summary of Toda-Yamamoto Granger non-causality test

Relation	Direction of causality
	$k = 4$
Treasury Bills vs. Unemployment rate	Bidirectional
Gross Domestic Product vs. Unemployment rate	Bidirectional
Inflation Rate vs. Unemployment Rate	Bidirectional

Source: Author's computation.

There is unilateral causality from Treasury bill to the unemployment rate and inflation rate. There is also unilateral causality from Gross Domestic Product to Unemployment rate and Inflation rate, also, from Inflation rate to Unemployment rate, i.e., the current value of unemployment rate can better be predicted using the past and current values of the Gross Domestic Product.

III. Conclusion

This study investigates the effect of GDP, interest rate, and inflation rate on the unemployment rate in Nigeria. The conditional unrestricted long-run level relationships show that the Gross Domestic Product rate does have a statistically significant effect on the unemployment rate in Nigeria. However, a small negative effect is also an indication that the long-term rising of Gross Domestic Product has a diminishing effect on the unemployment rate. The co-efficient of the co integrating relation EC_{t-1} measures the speed of adjustment to disequilibrium caused by shocks on GDP in the model. While GDP is rising, the unemployment rate is rising alongside it, and this implies that some sustainable sectors of the economy, which provide real jobs such as private sectors, are not equipped and empowered. The income from GDP is not channeled to the source. Furthermore, the result from the Toda and Yamamoto Granger non-causality reveals that there is unilateral causality from Treasury bill to the unemployment rate and inflation rate. There is also unilateral causality from Inflation rate to Unemployment rate from 2009. More importantly, from Gross Domestic Product to Unemployment rate, there is a unilateral relationship, i.e., the current value of the unemployment rate can better be predicted using the past values of the Gross Domestic Product. It is without doubt that the country's GDP is growing fast, but its contribution to unemployment is not desirable because an increased in GDP has not translated into an increase in the employment rate. This research work concluded that this is possible because income from GDP is not being plowed back to the real sector of the country's economy.

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