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Testing for Stagflation in Nigeria: A Non-Linear Autoregressive Distributed Lag (NARDL) Modeling Approach

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Abstract
This study applied an asymmetric approach to test for the presence or otherwise of stagflation in Nigeria using annual data from 1981 to 2019. The series were subjected to Ng-Perron unit root test and it was found that all the variables were stationary at I(1) except inflation rate which did so at I(0). The results of the bonds test confirmed the existence of long run relationship among the variables while the error correction model indicated that the variables could revert to equilibrium in any event of a temporary shock. The results of the NARDL indicated that both positive and negative changes in inflation exert positive influence on economic growth. Also, while positive changes in unemployment exert positive and significant impact on economic growth, the negative changes in unemployment were found to have negative and significant impact on economic growth contrary to known economic laws. Finally, oil revenue and real GDP per capita exerted positive and significant impact on economic growth. Thus the study concluded that there is no stagflation but "growflation" in Nigeria especially that positive changes in inflation and unemployment are accompanied by higher levels of economic growth. The study recommended among other things unless Nigeria starts refining her oil for domestic consumption and exports forward and backward linkages for job creation will elude her. The monetary and fiscal authorities in Nigeria must work together to keep inflation in check since lower levels of inflation tends to boost economic growth more significantly.
Keywords: Economic Growth, Inflation, Unemployment

1.0 Introduction

There is no known single economic theory that has completely divulged the relationships among the three major macroeconomic variables of economic growth, inflation and unemployment. Babalola, Saka and Adenuga (2013) held that there are two well-known empirical hypotheses that explain the relationships among inflation, economic growth and unemployment which are Phillips Curve (1958) and Okun's Law (1962). Whereas Phillips (1958) explains that there is a trade-off between inflation and unemployment; Okun (1962) contends that there is a negative relationship between economic growth and unemployment rate since higher economic growth attracts higher levels of employment. However, the relationship between economic growth and inflation according to "the Mundell-Tobin effect" is a positive one since inflation encourages savings for capital accumulation and investment for economic growth (Mundell, 1973 & Tobin, 1965).

Until recently, economists did not believe that a simultaneous combination of high unemployment and high inflation was possible. But the 'stagflation' of 1970's proved otherwise. Stagflation is a combination of the 'stag' of stagnation and 'flation' of inflation. The term explains the paradoxical inflationary phenomenon in which sustained and substantial price increases have been accompanied by declining output and rising unemployment (Vaish, 2005).

Incidentally, the phenomenon presents a more complex dimension in Nigeria where all the three variables appear to be on the rise defying even the nomenclature of stagflation. The Nigerian economy has always witnessed appreciable economic growth by even surpassing the global averages. From 2001 to 2014, the annual growth rates in Nigeria's GDP never went below 6.3% until the economy slipped into recession in 2015 and 2016. But by 2017 and 2108 it reverted back to the path of growth to close at 2.27% just 0.63% below the global average (The World Bank, 2020). Equally her real GDP per capita rose steadily especially from 1995 to 2019. From a real GDP per capita of N33,060 in 1995, it rose steadily to climax at N684.34 thousand in 2019 (CBN, 2019). To Emefiele (2017), the Nigerian economy has grown steadily over the past decade thereby becoming Africa's largest economy. However, Nigeria's economic growth is said to be closely linked with oil revenues (The Central Intelligence Agency (CIA), 2014; Alley, Asekomeh, Mobolji, & Adeniran (2014) and Igberaese (2013). Although, Fefa (2016) submitted that oil revenues in Nigeria (unlike Norway), have negative and significant effects in the long run due inappropriate oil revenue management channels.

Paradoxically, despite her high GDP and GDP per capita, unemployment rate and poverty has remained endemic in Nigeria. Unemployment rates in Nigeria have maintained a double digit since 2006 rising from 12.3% to 21.4% in 2010 and to a climax of 23.9% in 2011. At 9.9% in 2015 Nigeria's unemployment rate exceeded the world average unemployment rate of 4.44% (Economy Watch, 2016). According to Emefiele (2017), Nigeria's unemployment rate was estimated at 12% in 2015 with 25% of the labour force either unemployed or under employed. Nigeria's average unemployment rate in 2016 was found to be 32.4% with about 12 million being unemployed youths indicating that employment opportunities in the country have not expanded sufficiently. This is consistent with the report of NBS (2016) that the magnitude of employment in the country has not been sufficient or adequate to meet the ever-growing labour market; hence the continuous rise in the level of unemployment in the country. With the Nigerian labour force expanding by over 2.6 million annually, the economy needs to generate at least the same level of jobs annually just to hold the unemployment rate at the current level of 13.9%. In 2019, while the global unemployment rate stood at 5.4% that of Nigeria stood at 23.1% (International Labour Organization (ILO), 2020). This clearly shows that employment generation programmes of the government over the years have met their targets.

On the other hand, while stable and low levels of inflations are necessary for planning and smooth economic growth, Nigeria's inflation rates can be adjudged to be high necessitating a monetary policy framework for inflation targeting (CBN, 2011). According to the World Bank (2020), average global inflation rates have not reached 3% between 2013 and 2019; whereas Nigeria's inflation rates remained relatively high in double digits during the same period. Nigeria's inflation rate stood at 13.72% in 2010 and slightly declined to 10.84% in 2011. By 2017 it jumped to 18.55% and has remained in double digits till date (NBS, 2020). The persistently high inflation rates suggest that, inflation control measures such as Open Market Operations (OMO) and inflation targeting

have yielded little or no desirable results. It thus appears that the Nigerian economy suffers a simultaneous rise in inflation and unemployment rates even as there is palpable evidence that the economy is growing. Thus it is pertinent to examine the relationship among these variables using time series in a dynamic framework to pave way for feasible policy prescriptions that could effectively curb inflation; ensure a more stable economic growth and tame the unemployment hydra in Nigeria.

The relationship among inflation, economic growth and unemployment in Nigeria is largely investigated in pairs while very few studies have investigated the three variables at time. Also, studies have laid emphases on assessing the impact of inflation and unemployment on economic growth where quite an array of discordant conclusions has been drawn. For instance, Orji, Anthony-Orji and Okafor (2015), Shuaib, Okoria and Ogedengbe (2015), Mohammed, Okoroafor and Awe (2015) and Eze (2015) are of the view that both inflation and unemployment have negative influence on economic growth in Nigeria. On the other hand, Umaru, Donga and Musa (2013), Saidu and Mohammad (2015) as well as Ademola and Badiru (2016) contended that both inflation and unemployment have a positive impact on economic growth in Nigeria. But, Akeju and Olanipekun (2015), Nwankwo and Ifejiofor (2014) blamed the unemployment-growth positive relationship on Nigeria's 'non-inclusive growth' driven by the oil sector.

Consequently, one can see that there is no consensus among scholars on the kind of relationship that exists among economic growth, inflation and unemployment in Nigeria. Again the empirical evidence suggests that the Nigerian economy faces a situation of increasing inflation and unemployment amidst a growing economy. This position certainly does not depict Stagflation given that stagflation necessarily comes with a recessing or stagnating economic growth. This peculiar situation calls for further investigation using a dynamic framework since the economy is not static and hence this study. The rest of the paper is structured into section 2, which is literature review and section 3 which deals with the methodology of the study. Section 4 of the paper focuses on presentation of results and discussions while sections 5 dwell on conclusion and recommendations for policy options.

2.0 Literature Review

2.1 Theoretical Framework

There is no single economic theory that has completely explained the relationship among inflation, economic growth and unemployment and as such this study has reviewed theories explained the relationships among the variables in pairs. Economic growth in Nigeria can best situate in the Keynesian "general theory" and Hirchman's "unbalanced growth theory". Keynes (1936) contended that so long as aggregate demand remained below the equilibrium point the recession of the 1930's was going to persist until the government intervened by injecting liquidity into the economy to employ people to earn money and make consumption purchases. The Keynesian postulation discarded the laissez-faire model and made room for serious government intervention in stimulation of economic growth. Since then, government intervention has become a norm in stimulating economic growth in the world. On the other hand, Hircshman (1958) contended that economic growth is usually communicated from the leading sector of the economy to other sectors. Incidentally, the Nigerian economy has witnessed massive government intervention and has always depended on a leading sector. Agricultural sector used to be

the leading sector in Nigeria since the colonial days until the oil sector took over in 1967 till date.

Relatedly, the relationship between inflation and unemployment in what is today referred to as the Phillips curve was initiated by Fisher (1926) and later it was modified by Tinbergen (1936). Subsequently, Phillips (1958) building on their previous efforts conducted a research on stabilization policy in the United Kingdom about the speed with which input prices responded to excess demand and supply for the period 1862 to 1957. He found a clear negative relation between the rate of inflation and the unemployment rate during the period. Later, Samuelson and Solow (1960) confirmed this same relationship using the United States. The duo modified the classic Phillips curve by replacing the rate of change of nominal wages with the rate of inflation. However, since not all forms of inflation emanate from wage increase, it may be erroneous to assume that inflation must necessarily reduce unemployment. The stagflation of 1970s represented a concurrent worsening situation in both price level and unemployment where not only has Phillips curve shifted rightwards; it has also lost its characteristic slope (Gonda, 2005).

Again, Okun (1962) contended that certain amount of a country's gross domestic product (GDP) may be lost when the unemployment rate exceeds its natural rate. This implies that, total output is dependent on labour and as such there is a direct relationship between output and employment and an inverse relationship between output and unemployment (Wen & Chen, 2012). However, Tatom (1978) and Davies (1979) insisted that a closer examination of the Okun's law shows that the original empirical specification does not provide an accurate view of the link between changes in the nation's output and employment. It is therefore clear that Okun's law may not hold true in many countries of the world.

Finally, the relationship between inflation and economic growth is explained by "the Mundell- Tobin Effect". Mundell (1973) and Tobin (1965) postulated that, an increase in nominal interest rate caused by inflation will make investment more attractive than consumption. This ultimately will lead to capital accumulation for higher productivity and economic growth.

2.2 Empirical Review

The empirical review of this study is organized in such that studies that relate inflation and unemployment to economic growth are first considered. This is followed by studies that explain the peculiarities of the nature of Nigeria's economic growth. The third set of reviews focus on the determinants of unemployment in Nigeria. The last set of reviews focus on the relationship between inflation and unemployment. In each case, the most current studies are reviewed first.

Anning, Tuama and Darko (2017) examined the impact of inflation and unemployment on the economic growth of Iraqn from 1990 to 2014. The study adopted Vector Autoregressive (VAR) modeling approach and found that the long run equilibrium relationship between unemployment and inflation in Iraq validated the Phillips Curve hypothesis. On the other hand, Ademola and Badiru (2016) adopted a modified version of Okun's Model estimate the impact of unemployment and inflation on economic growth in Nigeria using annual data from 1981 to 2014. The study found a positive and significant relationship between economic growth and inflation as well as unemployment. In the same vein, Saidu and Muhammad (2015) found that both inflation and unemployment have very positive influence on economic growth in Nigeria just as concluded by Orji, Anthony-Orji

and Okafor (2015). These findings are however at variance with Mohammed, Okoroafor and Awe (2015), Eze (2015) as well as Mosheni and Jouzaryan (2016) who found that inflation and unemployment both have negative effects on economic growth in Nigeria.

O'Nwachukwu (2017) examined the determinants of the rate of unemployment in Nigeria from 1980 to 2016. Using Ordinary Least Square (OLS) technique to the study found government expenditure, inflation rate and population were statistically significant in explaining changes in unemployment in Nigeria during the period. The study recommended that allocations for capital project be increased while corrupt government officials should be punished severely. While, Akeju and Olanipekun (2015) found that there was a positive relationship between unemployment and economic growth in Nigeria; Siyan, Adegoriola and Adolphus (2016) concluded that high level of unemployment was responsible for poverty in Nigeria.

Ajakaiye, Jerome, Nabena and Alaba (2016) investigated the relationship between growth and employment in Nigeria between 1981 and 2014 in an attempt at explaining Nigeria's paradox of high economic growth alongside rising poverty and inequality. The study adopted the Shapley decomposition approach and a log-linear regression of employment on GDP and found that the relative high growth has not led to an appreciable increase in employment in Nigeria.

Anocha and Maduka (2015) examined the relationship between inflation and economic growth in Nigeria for the period 1970 to 2012. The study found a negative but statistically non-significant long-run non-linear relationship between inflation and economic growth. The non-linear relationship suggested that the adverse effect of inflation on economic growth was not universal but only when inflation exceeded some turning point or threshold level. However, Olu and Idih (2015) and Shuaib, Okeria and Ogedengbe (2015) investigated the effect of inflation on economic growth in Nigeria from 1980 to 2013 and 1960 to 2012 respectively. Both studies found that inflation impacted negatively on economic growth in Nigeria.

Oniore, Bernard and Gyang (2015) analyzed the macroeconomic determinants of unemployment in Nigeria using a time series data from 1981 to 2014. The parsimonious result indicated that GDP growth rate, inflation rate, degree of openness, and private domestic investment were statistically significant in influencing unemployment in the short run. It was recommended that private sector investment should be encouraged by the government at all levels. Ogbeide, Kanwanye and Kadiri (2015) blamed the high level of unemployment in Nigeria on natural resource rent. The study confirmed that resource dependency, shallow financial depth, poor public expenditure management, and wrong production technology choice undermines unemployment in Nigeria, and thus attainment of inclusive growth.

Relatedly, Alley, Asekomeh, Mobolaji and Adeniran (2014) examined the import of oil prices on Nigeria's economic growth and found that while oil shocks insignificantly retarded economic growth, oil prices significantly improved it. Igberaese (2013) confirmed that oil revenue in Nigeria has a strong positive and significant long run effect on economic growth. A comparative study between Nigeria and Norway by Fefa (2016) on the role of oil revenue on economic growth however concludes that unlike Norway, Nigeria's oil revenue has a long run negative impact on economic growth.

This study is however interested in testing for the presence or otherwise of stagflation in Nigeria. The study employs a dynamic framework that segregates both the

positive and negative impacts of inflation and unemployment on economic growth in the presence of lagged values of real GDP, real GDP per capita and oil revenues.

3.0 Methodology

3.1 Theoretical Model

This study utilized Non-linear Autoregressive Distributed Lag (NARDL) approach since it is very useful in handling cointegration and it is robust to misspecification of integration orders of relevant variables. Once variables are of mixed order of integration $I(0)$ and $I(1)$, ARDL or NARDL is most appropriate. This is because, the traditional cointegration methodologies of Engle-Granger (1987), Phillips and Ouliaris (1990) or Johansen (1995), typically fails since all variables need to have identical orders of integration, usually $I(1)$. This requires pre-testing for the presence of a unit root in each of the variables under consideration even as unit root tests are known to suffer size and power problems in many cases of interest (Perron & Ng, 1996). This study therefore adopts the Ng-Perrron unit root technique to test for the presence or otherwise of unit root in each of the variables under consideration to avert the challenge. Besides, the Pesaran, Shin, and Smith (2001) Bounds test for cointegration is not subject to such limitations when series have mixed order of integration and thus, readily accommodates the nuances. The NARDL method therefore works when all or some variables are $I(0)$, $I(1)$ or even mutually cointegrated.

3.2 Model Specification

According to Keynes (1936) and Okun (1962) there is a functional relationship between economic growth and the level of unemployment. The relationship can be represented mathematically as:

$$RGDP = f(UNER) \quad (1)$$

where RGDP is a measure of economic growth (Real Gross Domestic Product) and UNE is a measure of unemployment rate. Again, given that inflation necessitates economic growth according to "Mundell-Tobin Effect" the study adds inflation rate (INFR) as additional variable.

$$RGDP = f(UNER, INFR) \quad (2)$$

Finally, it is also apt to factor in Nigeria's average income level (that is Real GDP per Capita income RGPC) and OIL Revenue (OILR) as additional control variables. This is because the potency of RGPD growth is confirmed by RGPC in a high population growth economy like Nigeria. Again, Nigeria's economic growth is said to be closely linked with oil revenues. Thus equation (2) can be expressed as:

$$RGDP = f(UNER, INFR, RGPC, OILR) \quad (3)$$

Thus the explicit stochastic form of the model can be expressed as:

$$RGDP_t = \beta_0 + \beta_1 UNER_t + \beta_2 INFR_t + \beta_3 RGPC_t + \beta_4 OILR_t + \xi_t \quad (4)$$

Where β_0 - β_4 are coefficients and ξ_t is the error term.

By taking a semi-log of equation (6), the study obtains:

$$nRGDP_t = \beta_0 + \beta_1 UNER_t + \beta_2 INFR_t + \beta_3\ nRGPC_t + \beta_4\ nOILR_t + \xi_t \quad (5)$$

In order to capture the relation between economic growth and the rest of the explanatory variables in a dynamic framework which is a true reflection of most economic relationships, a Non-Linear Autoregressive Distributed Lag (NARDL) model is adopted. This model is useful in obtaining efficient estimates in situations where the sample size is not very large. It is also useful in obtaining short and long run estimates that are unbiased. The choice of a lag model here is also apt in that economic relationships are rarely instantaneous; the effect of one variable on another takes time and such effects vary with passage of more time. The use of lag values of a dependent variable as regressors also confirms that most economic variables are useful in predicting their future values (Gujarati, 2013). It must be noted however that NARDL necessarily proceeds from ARDL. Thus the generic form of ARDL is specified first and the NARDL follows. The generic ARDL

$(p, q_1, ..., q_k)$ model is specified as:

$$y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \psi_i y_{t-i} + \sum_{j=1}^{k} \sum_{l_j=0}^{q_i} \beta_{j,l_j} x_{j,t-l_j} + \varepsilon_t \quad (6)$$

Where ε_t are the usual innovations, α_0 is a constant term, and α_1, ψ_i and β_{j,l_j} are respectively the coefficients associated with a linear trend, lags of y_t, and lags of the k regressors $x_{j,t}$ for $j = 1, ..., k$. Following the general specification, equation (8) can be expressed as:

$$nRGDP_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \psi_0 \ nRGDP_{t-i} + \sum_{j=0}^{q} \psi_1 UNER_{j-q} + \sum_{j=0}^{q} \psi_2 INFR_{j-q} + \sum_{j=0}^{q} \psi_3 \ nRGPC_{j-q} + \sum_{j=0}^{q} \psi_4 \ nOILR_{j-q} + \varepsilon_t \quad (7)$$

However, the asymmetric (or NARDL) form of equation (7) can be specified as follows to account for the effects of the positive and negative changes in unemployment and inflation rates on economic growth:

$$nRGDP_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \psi_1 \ nRGDP_{t-i} + \sum_{j=0}^{q} \psi_2 UNER\_POS_{j-q} + \sum_{j=0}^{q} \psi_3 UNER\_NEG_{j-q} + \sum_{j=0}^{q} \psi_4 INFR\_POS_{j-q} + \sum_{j=0}^{q} \psi_5 INFR\_NEG_{j-q} + \sum_{j=0}^{q} \psi_6 \ nRGPC_{j-q} + \sum_{j=0}^{q} \psi_7 \ nOILR_{j-q} + \xi_t \quad (8)$$

However, the intertemporal dynamics regression is a typical starting point for most NARDL applications. Since the study is interested in estimating the relationship between y_t on both its lags and the contemporaneous and lagged values of the k regressors $x_{j,t}$. This can be stated as:

$$y_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \psi_i y_{t-i} + \sum_{j=1}^{k} \beta_j(1) x_{j,t} + \sum_{j=1}^{k} \beta_j(L) \Delta x_{j,t} + \varepsilon_t \quad (9)$$

where we use the first difference notation $\Delta = (1-L)$. Since the above equation does not explicitly solve for y_t, it is typically interpreted as a regression for intertemporal dynamics. The practical regression setting of the above model that uses theoretical coefficients is specified as:

$$nRGDP_t = \alpha_0 + \alpha_1 t + \sum_{i=1}^{p} \beta_{0,i}\, nRGDP_{t-i} + \beta_1 UNER\_POS_t + \beta_2 UNER\_NEG_t + \beta_3 INFR\_POS_t + \beta_4 INFR\_NEG_t + \beta_5 RGPC_t + \beta_6 OILR_t +$$
$$\sum_{j=1}^{k} \phi_{1,j} \Delta UNER\_POS_{t-j} + \sum_{j=1}^{k} \phi_{2,j} \Delta UNER\_NEG_{t-j} + \sum_{j=1}^{k} \phi_{3,j} \Delta INFR\_POS_{t-j} + \sum_{j=1}^{k} \phi_{4,j} \Delta INFR\_NEG_{t-j} + \sum_{j=1}^{k} \phi_{5,j} \Delta\, nRGPC_{t-j} + \sum_{j=1}^{k} \phi_{6,j} \Delta\, nOILR_{t-j} + \varepsilon_t \quad (10)$$

The conditional Error Correction Form and the Bounds Test can be specified as:

$$\Delta y_t = \alpha_0 + \alpha_1 t - \psi(1) EC_{t-1} + \left(\psi^*(L) \Delta y_{t-1} + \sum_{j=1}^{k} \beta_j(L) \Delta x_{j,t-1} \right) \quad (11)$$

From equation (12), it is clear that the error correction term, typically denoted as EC_t, is also the cointegrating relationship when y_t and $x_{1,t},..., x_{k,t}$ are cointegrated. Now, the model with restricted constant and no trend can be specified as:

$$\Delta y_t = \alpha_0 + b_0 y_{t-1} + \sum_{j=1}^{k} b_j x_{j,t-1} + \sum_{i=1}^{p-1} c_{0,i} \Delta y_{t-i} + \sum_{j=1}^{k} \sum_{l_j=1}^{q_j-1} c_{j,l_j} \Delta x_{j,t-l_j} + \sum_{j=1}^{k} d_j \Delta x_{j,t} + \varepsilon_t \quad (12)$$

And then: $$EC_t = y_t - \sum_{j=1}^{k} \frac{b_j}{b_0} x_{j,t} - \frac{a_0}{b_0} \quad (13)$$

With $H_0 : b_0 = b_j = \alpha_0 = 0, \forall_j$ Where is a vector and the variables in x_t are allowed to be purely I(0) or I(1); α is a Constant b, c and d are coefficients $j = 1,..., k$; p, q are optimal lag orders and ε_t is a vector of the error terms. Therefore, the asymmetric error correction model for this study can be specified as:

$$\Delta\, nRGDP_t = \sum_{i=1}^{p} \beta_1\, nRGDP_{t-i} + \sum_{i=1}^{q} \beta_2 \Delta UNER\_POS_{t-i} + \sum_{i=1}^{q} \beta_3 \Delta UNER\_NEG_{t-i} + \sum_{i=1}^{q} \beta_4 \Delta INFR\_POS_{t-i} + \sum_{i=1}^{q} \beta_5 \Delta INFR\_NEG_{t-i} +$$
$$\sum_{i=1}^{q} \beta_6 \Delta\, nRGPC_t \sum_{i=1}^{q} \beta_7\, nOILR_{t-i} + \lambda EC_{t-i} + \varepsilon_t \quad (14)$$

Where λEC_{t-i} = is the component to speed of adjustment towards long run component of the model and ε_t is the error term.

4.0 Results and Discussions

Table 1: Descriptive Statistics

	RGDP	INFR	UNER	GDPC	OILR
Mean	34690.67	19.0436	11.3564	178.4978	2430.35
Median	23688.28	12.2000	11.9000	57.2553	1230.85
Maximum	71387.83	72.8000	27.4000	684.4316	8878.97
Minimum	13779.26	5.4000	1.9000	0.7291	7.2530
Std. Dev.	20237.78	17.1175	7.6528	217.8786	2723.421
Skewness	0.673787	1.7795	0.5036	0.9868	0.7760
Kurtosis	1.880848	4.9740	1.9226	2.5264	2.2802
Jarque-Bera	4.986242	26.9145	3.5348	6.6952	4.7561
Probability	0.082652	0.000001	0.1708	0.0352	0.0927

Source: Extract from E-views 10

RGDP: Table 1, presents the descriptive statistics of the five variables used in this study. The variables were measured on annual basis beginning from 1981 to 2019 (a period of 39 years). Nigeria's RDGP was measured in naira at 2010 constant prices and it averaged around N34.69 trillion. The highest RGDP in Nigeria was recorded in 2019 to be N71.39 trillion and the least was recorded to be N13.78 trillion in 1984. The standard deviation of the variable showed that it wondered around N20.24 trillion and it is skewed towards positive and higher values. The kurtosis of 1.88 which is less than threshold of 3 shows that RGDP in Nigeria does not have a steep slope and so the distribution is platykurtic. Its probability value of 0.08 and high Jarque-Bera statistic of 4.99 indicate that RGDP in Nigeria during the time under review is not normally distributed.

Inflation Rate (INFR): Inflation rate averaged around 19.04 with a standard deviation of 17.12 showing that the variable did not wonder widely apart from an out layer of 72% in 1995 which was the highest inflation rate and a minimum inflation rate of 5.4% recorded in 2008. The variable has a tendency for higher values since it is positively skewed and it is leptokurtic implying that it is peaked. Its distribution not normal given its Jarque-Bera statistic of 26.00 and a low probability value of 0.0000.

Unemployment Rate (UNER): It averaged around 11.36% with an all-time high rate of 27.40% recorded in 2013 while the least level of unemployment rate was recorded in 1996 to be 1.90%. The distribution of unemployment rate in Nigeria shows that it is positively skewed and it is not normally distributed with a Jarque-Bera statistic of 3.53 which is far from zero.

Gross Domestic Product Per Capita (GDPC): It is calculated by dividing the annual RGDP of Nigeria in a year by the population of Nigerians in that year. Nigeria's population has witnessed a steady growth yet, the Real GDPC has witnessed a steady rise especially form 1995 till 2019. GDPC is positively skewed; implying that it has a tendency towards higher values.

Oil Revenue (OILR): The average OILR stands at N2.43 trillion with the highest revenues generated from oil to be N8.8 trillion in 2011 due to high international oil prices in that year. Although oil prices fluctuate internationally, oil revenues in Nigeria has a tendency for higher values given its skewness of 0.776. The variable wonders widely with a standard deviation of over 2.7 trillion and it is not normally distributed given its high Jarque-Bera value of 4.77 and probability value of 0.093.

Summary of Ng-Perron Unit Root Test Results

Table 2: Ng-Perron Unit Root Test

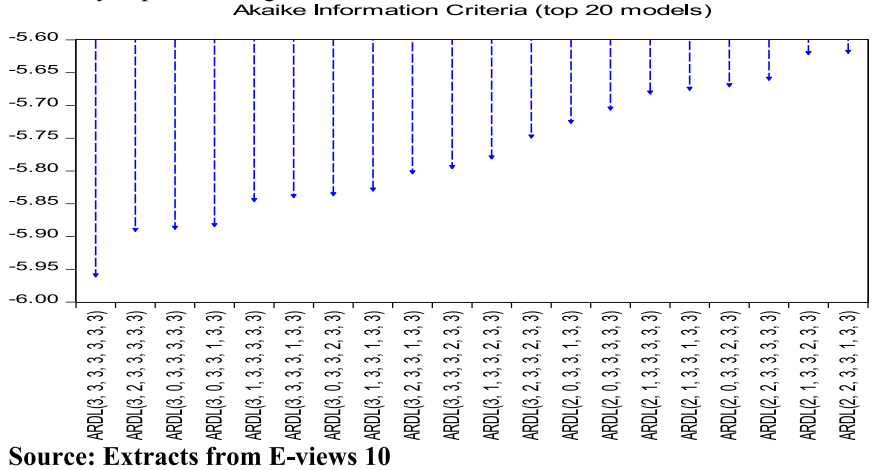
Variable	MZa -8.1000	MZt -1.9800	MSB 0.2330	MPT 3.1700	Stationarity	Remark
LRGDP	0.2108	0.1215	0.5765	24.0586	I(0)	Not Stationary
D(LGDP)	-10.5474	-2.2960	0.2177	2.3246	I(1) **	Stationary
INF	-13.7084	-2.6174	0.1909	1.7898	I(0) **	Stationary
UNER	-2.4053	-0.8631	0.3588	8.9052	I(0)	Not Stationary
D(UNER)	-18.272	-3.0175	0.1651	1.3591	I(1)**	Stationary
LGDPC	0.8910	0.9998	1.1221	83.8214	I(0)	Not Stationary
D(LGDPC)	-18.2125	-3.0171	0.1657	1.3471	I(1) **	Stationary
LOILR	0.47172	0.4968	1.0532	68.3091	I(0)	Not Stationary
D(LOILR)	-18.3987	-3.0320	0.1648	1.3355	I(1)**	Stationary

Source: Extract from E-views 10

The results of the Ng-Perron unit root test show that all the variables were stationary at first difference except inflation which was found to be stationary at levels. This shows that there is mixed order of integration. Stationarity in Ng-Perron Test is attained when all or at least majority of the values of MZa, MZt, MSB and MPT are less than their corresponding critical values at 5% level of significance. The asterisks (**) indicate that the variable is stationary otherwise, it is not.

Optimal Lag Selection

A typical characteristic of dynamic models is the use of lag values and it always better to work with the optimal number of lags in order to obtain unbiased estimates. Using the Akaike Information Criteria, the optimal lags for this model was estimated to be lag 3 as clearly depicted in Figure 1.



Source: Extracts from E-views 10

Bounds Test for Long Run Relationship

To ensure that the variables of the model will not drift apart in the long run, bounds test was carried out to confirm whether or not there was a long run relationship among the variables.

Table 3: Bounds Test Results

Level of Significance	F- Statistic Value	Lower Bound I(0)	Upper Bound I(1)
10%		1.99	2.94
5%	13.8587	2.27	3.28
2.5%		2.55	3.61
1%		2.88	3.99

Source: Extracts from E-views 10

It can be observed from Table 3 that, the F-statistic value of 13.8587 is greater than all the values for lower and upper bounds at 5% level of significance. The study therefore rejects the null hypothesis of no level relationship and concludes that there is a long run relationship among the variables used in the study.

Short Run Error Correction Model

Having confirmed the existences of a long run relationship, the study proceeded to estimate the Error Correction Model (ECM) to account for short run dynamics as shown in Table 4.

Table 4: Results of the Asymmetric Error Correction Model (ECM)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LRGDP(-1))	0.6406	0.0665	9.6289	0.0000
D(LRGDP(-2))	0.3268	0.0784	4.1688	0.0042
D(INFR_POS)	-0.0009	0.0003	-3.7628	0.0070
D(INFR_POS(-1))	-0.00127	0.0002	-5.2054	0.0012
D(INFR_POS(-2))	-0.0006	0.0003	-2.0929	0.0746
D(INFR_NEG)	0.0044	0.0004	10.2617	0.0000
D(INFR_NEG(-1))	-0.0019	0.0002	-9.01021	0.0000
D(INFR_NEG(-2))	-0.0018	0.0002	-8.0718	0.0001
D(UNER_POS)	0.0125	0.0009	13.1551	0.0000
D(UNER_POS(-1))	0.0064	0.0008	7.7012	0.0001
D(UNER_POS(-2))	0.0057	0.0007	8.1845	0.0001
D(UNER_NEG)	-0.0004	0.0010	-0.3984	0.7022
D(UNER_NEG(-1))	-0.0011	0.0010	-1.0624	0.3233
D(UNER_NEG(-2))	-0.0027	0.0010	-2.8346	0.0252
D(LOILR)	-0.0065	0.0051	-1.2656	0.2462
D(LOILR(-1))	-0.0989	0.0093	-10.6168	0.0000

D(LOILR(-2))	-0.0522	0.0065	-8.0140	0.0001
D(LGDPC)	-0.0147	0.0072	-2.0283	0.0821
D(LGDPC(-1))	-0.1043	0.0096	-10.9167	0.0000
D(LGDPC(-2))	-0.0368	0.0085	-4.3304	0.0034
ECM(-1)*	-0.4888	0.0328	-14.8909	0.0000

Source: Authors' Extract from E-views 10

It is evident from the results of the ECM that in the event of any temporary deviation from equilibrium path among the variables, they can adjust back to equilibrium within a year. This is because, the ECM coefficient (-0.4888) is negatively and correctly signed. Its probability value of 0.0000 is statistically significant since it is less than the 0.05 threshold value.

Again, in the short run, lag values of RGDP up to lag 2 have positive and significant influence on economic growth. However, positive changes in the level of inflation and its lag values up to lag 2 are negatively related with economic growth in the short run. On the contrary negative changes in inflation have positive and statistically significant relationship on economic growth except its lag values which have negative influence on economic growth in the short run.

However, contrary to Okun's law, positive changes in unemployment and its lag values up to lag 2 were found to have positive and statistically significant influence on the level of economic growth in Nigeria in the short run. On the other hand, negative changes in the level of unemployment and its lags were found to have negative influence on economic growth in Nigeria in the short run. This implies that higher levels of economic growth do not translate to higher levels of job creation in Nigeria and vice versa. The short run model also indicates that oil revenues and real GDP per capita and their respective lags up to lag 2 do not positively influence the level of economic growth in Nigeria in the short run.

Long Run Results of the NARDL Model

Actual economic analyses are best situated in the long run effects of economic relationships and as such the asymmetric results of the long run NARDL were obtained and presented in Table 5.

Table 5: Results of NARDL Model where LRGDP is the dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
INFR POS	0.0006	0.0016	0.4010	0.7004
INFR_NEG	0.0141	0.0021	6.8861	0.0002
UNER_POS	0.0123	0.0027	4.5325	0.0027
UNER_NEG	-0.0123	0.0037	-3.3491	0.0123
LOILR	0.2179	0.0314	6.9375	0.0002
LGDPC	0.1954	0.0344	5.6803	0.0008
C	9.4334	0.0718	131.3586	0.0000

Source: Authors' Extract from E-views 10

Table 5 presents the results of the long run NARDL model. It can be observed that in the long run the influence of lag values of RGDP on economic growth fizzled out while that of the remaining four predictors remained very significant. It evidently clear that positive changes in the level of inflation have positive influence on the level of economic growth in Nigeria. Also, negative changes in the level of inflation brings about positive and significant increases in the level of economic growth in the long run. This is theoretically plausible since lower levels of inflation are expected to trigger investment for higher productivity and economic growth. The puzzle however remains that even increasing levels of inflation have positive impact on economic growth in Nigeria in the long run.

Interestingly too, positive changes in the level of unemployment have very positive and significant influence on economic growth in Nigeria which is a negation to fundamental economic theories like the Okun's Law. On the contrary too, as unemployment witness negative changes, economic growth declines significantly. The general expectation is that lower levels of unemployment should boost economic growth and vice versa. This implies that, higher levels of economic growth do not translate to higher job creation opportunities in Nigeria as explained by Ajakaiye, Jerome, Nabena and Alaba (2016).

These findings are similar with conclusions drawn by Eze (2015) and Ademola and Badiru (2016). They are however at variance with conclusions made by Okoroafor and Awe (2015), Saidu and Muhammad (2015) as well as Mosheni and Jouzaryan (2016). In the same vain, contrary to the submissions of Fefa (2016) that oil revenue in Nigeria has a negative effect on economic growth, the study found that oil revenue in Nigeria has a long run positive and significant effect on economic growth in tandem with Alley, Asekomeh, Mobolji and Adiniran (2014) and Igberaese (2013). This implies that an oil-export revenue dependent economy like Nigeria may not necessarily need higher labour inputs to grow nor generate more jobs in the growth process since the Nigeria oil sector do not generate many direct jobs domestically.

Finally, it can be observed that gross capita per income also has a positive and significant effect on economic growth in Nigeria. The results thus conform to the direction of the descriptive statistics and indicate that the phenomenon in the Nigerian economy defies the nomenclature of "stagflation".

Post Estimation Tests

After the NARDL long run model was estimated, it was subjected to series of tests of fitness. The tests results are presented using Tables 6, 7 and 8.

Table 6: NARDL Ramsey RESET Test

	Value	**Df**	**Probability**
t-statistic	0.9299	27	0.3607
F-statistic	0.8648	(1, 27)	0.3607

Source: Extract from E-views 10

Results of the Ramsey Regression Equation Specification Error Test in table 6 show that the relationship among the variables was correctly specified. As it can be

observed, the probability values of both t-statistic and F-statistic are greater 0.05 probability threshold.

Table 7: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.2283	Prob. F(27,7)	0.9977
Obs*R-squared	16.388	Prob. Chi-Square(27)	0.9451
Scaled explained SS	1.4425	Prob.Chi-Square(27)	1.0000

Source: Extract from E-views 10

Table 7 confirms that the variance of the errors of the variables were homoscedastic. This because, all the probability values of 0.9977, 0.9451 and 1.0000 for F-statistic, Observed R-squared and scaled explained SS are respectively and individually greater than 0.05.

Table 8: Breusch-Godfrey Serial Correlation LM Test

F-statistic	2.6433	Prob. F(2,5)	0.1647
Obs*R-squared	17.9878	Prob. Chi-Square(2,5)	0.1221

Source: Extract from E-views 10

The results of the Breusch-Godfrey Serial Correlation LM Test show that the variables of the model were serially independent. This is confirmed by the results of the probability values of 0.1647 and 0.1221 which are greater than 0.05.

5.0 Conclusion and Recommendations

This study concludes that the Nigerian economy has witnessed a simultaneous increase in economic growth, inflation and unemployment which is not a case of "stagflation" but "growflation". Grow inflation is a new coinage to depict a situation whereby growing inflation and unemployment rates are not accompanied by recessing or stagnating economic growth but high levels of growth. This conclusion is based on the fact that the proceeds of the oil sector which drives economic growth in Nigeria are not properly channeled to tackle unemployment and as such, the growth of the economy does not translate to creation of more jobs. It also entails that higher level of labour productivity is not a necessary condition for the Nigeria economy to grow hence the positive unemployment rate-economic growth relationship. Relatedly, both positive and negative changes in the rates of inflation in Nigeria exert positive impact on economic growth only that the influence of the negative changes tends to be stronger. Based on the findings of this study, it is recommended that:

Given that the Nigerian economy still witnesses growth amidst growing unemployment, it means that the potentials of the economy are not properly harnessed. The federal government must ensure that Nigeria starts refining her crude oil for consumption and exports. In this way, there will be forward and backward linkages in the oil sector and other sectors in such a way that Nigeria's economic growth will generate adequate jobs to tackle higher levels of unemployment in Nigeria. In the interim, governments at all levels must ensure that revenues from oil which drives economic growth in Nigeria are applied judiciously to benefit the generality of Nigerians by building standard infrastructure and

providing adequate social security to the vulnerable people in Nigeria. This will generate more jobs and reduce the high level of income inequality among Nigerians.

The positive relationship between positive changes in inflation and economic growth implies that higher rates of inflation do not hamper economic growth in Nigeria. But given that the negative changes in inflation exert more significant positive impact on economic growth, it shows that lower levels of inflation will accelerate economic growth in Nigeria. There is therefore a compelling need for the Central Bank of Nigeria (CBN) to set appropriate inflation targets and monitor same closely using necessary monetary tools to make sure that it does not escape the threshold beyond which it will dampen economic growth. Relevant fiscal authorities like the ministry of finance and revenue boards and agencies should also work in hand with the CBN to ensure that inflation targets are met and excess liquidity is kept at check in the economy.

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