

The Analysis Of The Relationship Between Inflation, Unemployment And Economic Growth In Nigeria (1980-2014).

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ABSTRACT

This research work investigates the relationship between inflation, unemployment and economic growth in Nigeria (1980-2014). The objectives of the study is to examine the short run and the long run relationship between inflation, unemployment and economic growth in Nigeria. It begins with the application of Augmented Dickey-Fuller techniques to examine the unit root property of the time series data after which Autoregressive Distributive Lag Model (ARDL) was used to determine the cointegration or long-run relationship. Lastly, Vector Autoregressive (VAR) model test was conducted to investigate the causal relationship between the variables studied. Empirical findings from ARDL model shows that there is no short and the long run relationship between unemployment rate, inflation rate and real GDP growth rate in Nigeria. The results of VAR model do not indicate robust evidence and do not confirm an inverse linkage between unemployment rate and economic growth. In view of the foregoing, the study therefore recommends the adoption of fiscal measures that enhance economic growth and private sector activities, hence promoting economic growth and employment generation. In addition, key economic incentives are needed towards attracting foreign direct investment (FDI) in productive sectors of the national economy and expanding resource utilization base.

Keywords: Unemployment, Inflation, Economic growth and Okun's Law

INTRODUCTION

Inflation and unemployment remain serious issues in any economy. It is part of the overall macroeconomic policy objectives that an economy maintain low rates of inflation and unemployment. Unarguably, parts of the macroeconomic goals which the government strives to achieve are the maintenance of stable domestic price level, stable economic growth and full-employment. Macroeconomic performance is judged by three broad measures- unemployment rate, inflation rate, and the growth rate of output (Ugwuanyi, 2004).

Unemployed is a person who did absolutely nothing at all or did something but not for up to 20 hours in a week. Underemployment however occurs if a person work less than full time which is 40 hours but work at least 20 hours on average a week or a person that work full time but is engaged in an activity that underutilizes his/her skills, time, educational qualification and wages. (National Bureau Statistics, 2015). Inflation on the other hand, connotes the general increase in the price level and is broadly an average measure because at any point in time, prices may be increasing, decreasing or constant; a persistent increase in prices hurts the economy, particularly the poor who have little or no savings to cushion rising prices. It is even worse when uncertainty follows price increases (Nwaobi, 2009).

Looking at the Nigerian data, the inflationary trend shows that it has been non-linear overtime. Inflation rate in Nigeria average 12.15 percent from 1996 until 2015, reaching an all-time high of 47.56 percent in January of 1996 and a record low of -2.49 percent in January of 2000. Unemployment rate in Nigeria averaged 11.45 percent from 2006 until 2015, reaching an all-time high of 23.90 percent in the fourth quarter of 2011 and a record low of 5.30 percent in the fourth quarter of 2006. While the GDP Annual Growth Rate in Nigeria averaged 4.03 percent from 1982 until 2016, reaching an all-time high of 19.17 percent in the fourth quarter of 2004 and a record low of -7.81 percent in the fourth quarter of 1983. (National Bureau of Statistics, Nigeria, 2015).

Statement of the Research Problems

The Nigerian economy has remained largely underdeveloped despite its possession of vast human and natural resources. The per capita income is low, unemployment and inflation rates are high. The economic crisis ravaging the Nigerian economy lately has taken a new dimension. That is, the inability of some states government to pay salaries of workers which later resulted to bail-out by the Federal Government, and the decline of crude oil price in the international market which has contracted our foreign exchange earnings and creation of jobs for the teaming youth that are willing and able to work.

The situation in Nigeria is disturbing as various macroeconomic policies by government have been unable to results in sustained price stability, reduction in unemployment and economic growth. The economy has continued to witness recession since the emergence of Buhari-led administration. Hence, the fluctuations in the economy have confirmed the need for proactive strategies adoption towards economic management as a way of fast-tracking employment generating growth and development.

Objectives of the Study

The broad objective of this study is to empirically investigate the relationship between inflation, unemployment and economic growth in Nigeria. Other objectives of the study are:

- 1) To examine the short run causal relationship between inflation, unemployment and economic growth in Nigeria.
- 2) To examine whether there is long run relationship between inflation, unemployment and economic growth in Nigeria.
- 3) To examine whether economic growth has impact on unemployment in Nigeria.

LITERATURE REVIEW

Sa'idu B, et al. (2015) examines how unemployment and inflation substantially affect economic growth. The result of causality test suggests that unemployment does not granger causes economic growth and inflation, but economic growth and inflation Granger cause unemployment, also there exist Granger causality between economic growth and inflation. Therefore, the result suggests a one-way causation flowing from inflation to GDP.

Keshmeer M, et al. (2015) investigates whether long run association among growth and unemployment is relevant for Fiji for the period 1982-2012. Johansen Cointegration test procedure was applied to ascertain the association among growth, investment and unemployment. Result confirmed the evidence of long-run association among unemployment and growth, with cointegration running from investment and unemployment to increase in economic output.

Fouzeia M, et al. (2015) investigates the relationship between growth and unemployment in Egypt. The results indicated there were no cointegration relationship between the variables of unemployment and GDP specifically implying there is no long-term relationship

Hussein Ali Al-Zeaud (2014) investigates the existence of trade-off relationship between unemployment and inflation in the Jordanian economy between 1984 and 2011. The results shown no causal relationship between unemployment and inflation in Jordan during the study period which means there is no trade-off relationship between the two variables.

Thayaparan A. (2014) examine the impact of inflation and economic growth on unemployment in Sri Lanka (1990-2012). The study discovered that unemployment granger caused by inflation. While, GDP does not granger cause unemployment. Unemployment and inflation both does not granger causes GDP growth rate, but unemployment and GDP growth rate both causes inflation.

Muhammad Aamir Khan (2013), investigates the link between the real GDP growth and unemployment, as described by Okun's law. The empirical analysis shows that a rise of one percentage point of unemployment is associated with a decline of 0.36 percentage point of real GDP growth.

Murat S, et al. (2014), estimate empirically the relationship between economic growth and unemployment rate in FYR of Macedonia applying the Okun's Law. Based on the VAR methodology and Engel-Granger cointegration test, she found no causal relationship between these two variables and a change in the growth rate of real GDP doesn't causes a change in the rate of unemployment and vice-versa.

METHODOLOGY

Sources of Data

The study used a sufficient length of secondary data ranging from 1980-2014 (34 years). The data were collected from different sources. Real GDP growth rate was sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin from 1980-2015, while unemployment rate and inflation rate were collected from the National Bureau of Statistics (NBS), 1980-2015.

Testing for the Order of Integration

The Augmented Dickey-Fuller (ADF) test, (Dickey-Fuller 1986, 1981, 1979) is based on the stationary study of variable series on the following model (Pinn et al (2011):

$$\Delta Y_t = \beta_0 + \beta_1 Y_{t-1} + \alpha_i \sum \Delta Y_{t-i} + \mu_t \dots\dots\dots(1)$$

Where: t is the linear trend, ΔY_t = Differenced value of a given time series variable, β_0 = Constant parameter, β_1 = Coefficient of the first lag value of the series variable, Y_{t-1} = First lag value of a series variable, α_i = Coefficient of the lag values of the differenced time series, ΔY_{t-i} = Lag values of the differenced series variable, μ_t = Error term. If the calculated ADF test statistics is less than the critical value, the null hypotheses (H_0) of a unit root cannot be rejected and the series is said to be non-stationary. The order of integration of Y is determined by conducting the ADF test on its first difference. The series will be integrated of order 1 if its first difference does not possess a unit root.

Autoregressive Distributive Lag (ARDL) Model

The Autoregressive Distributive Lag model (ARDL) is as follows:

$$\Delta \text{UNEM}_t = \lambda_0 + \sum_{i=1}^n \lambda_{1i} \Delta \text{UNEM}_{t-i} + \sum_{i=1}^n \lambda_{2i} \Delta \text{RGDP}_{t-i} + \sum_{i=1}^n \lambda_{3i} \Delta \text{INFL}_{t-i} + \lambda_4 \text{RGDP}_{t-1} + \lambda_5 \text{UNEM}_{t-1} + \lambda_6 \text{INFL}_{t-1} + \phi \text{ECM}_{t-1} + \varepsilon_t \dots \dots \dots (2)$$

In the above model, Δ is the first-difference operator, and λ_s ' indicate long run coefficients and short run coefficients as represented, ϕ is the coefficient of Error Correction Mechanism (ECM), ε_t is the error/residual (white noise).

Decision Rules

The test of bound test is based on the F-test or Wald-test. F-test is to test the two following hypotheses as bellow:

H₀: $\lambda_4 = \lambda_5 = \lambda_6 = 0$, no cointegration or long run relationship between the variables

H₁: $\lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0$ there is cointegration between the variables.

Since F-test does not have a standard distribution (non-standard distribution), the two critical values are given for the Upper Critical Bound (UCB) and Lower Critical Bound (LCB) (Pesaran et al, 2001). LCB value assumes all variables are I(0), meaning there is no cointegration between variables, while the UCB assumes all variables are I(1) which means that there is cointegration between variables. If the calculated F value is greater than UCB, hypotheses H₀ is rejected. Therefore, there is cointegration between the variables. The opposite is true if the calculated F value is smaller than the LCB, this means that hypotheses H₀ should be accepted. If the F calculated is between the LCB and UCB, this indicates that the result could not be ascertained.

Short-Run Causality

The short-run causality is thus determined from the ARDL model above (Eq-2);

$$\Delta \text{UNEM}_t = \phi_0 + \sum_{i=1}^n \phi_{1i} \Delta \text{UNEM}_{t-i} + \sum_{i=1}^n \phi_{2i} \Delta \text{RGDP}_{t-i} + \sum_{i=1}^n \phi_{3i} \Delta \text{INFL}_{t-i} + \lambda_2 \text{ECM}_{t-1} + \varepsilon_{t1} \dots \dots (3)$$

$$\Delta \text{RGDP}_t = \psi_0 + \sum_{i=1}^n \psi_{1i} \Delta \text{UNEM}_{t-i} + \sum_{i=1}^n \psi_{2i} \Delta \text{RGDP}_{t-i} + \sum_{i=1}^n \psi_{3i} \Delta \text{INFL}_{t-i} + \lambda_1 \text{ECM}_{t-1} + \varepsilon_{t2} \dots (4)$$

$$\Delta \text{INFL}_t = \delta_0 + \sum_{i=1}^n \delta_{1i} \Delta \text{UNEM}_{t-i} + \sum_{i=1}^n \delta_{2i} \Delta \text{RGDP}_{t-i} + \sum_{i=1}^n \delta_{3i} \Delta \text{INFL}_{t-i} + \lambda_3 \text{ECM}_{t-1} + \varepsilon_{t3} \dots \dots (5)$$

Δ is the difference operator, ECM representing the error - correction term derived from the long-run cointegrated relation from the above specified ARDL models. In equation 3, 4 and 5, λ_s ' should exhibit a negative and significant sign for causality to exist in the long run.

Granger Causality relationship to test whether:

- Unemployment (UNEM) is the determinant to real GDP growth rate (UNEM- led RGDP) or otherwise, real GDP growth rate as the cause to unemployment (RGDP- led UNEM).
- Unemployment (UNEM) is the determinant to inflation rate (UNEM- led INFL) or vice versa, as INFL is the determinant to unemployment (INFL- led UNEM)
- Inflation (INFL) is the determinant to real GDP growth rate (INFL- led RGDP) or otherwise, as RGDP is the determinant to inflation (RGDP- led INFL).

Vector Autoregressive (VAR) Model

VAR models generalize the univariate autoregressive model by allowing for more than one evolving variable. All variables in a VAR enter the model in the same way each variable has an equation explaining its evolution based on its own lags and the lags of the other model variable. Therefore, the VAR framework for this study is as follows:

$$UNEM_t = \beta_0 + \sum_{i=1}^n \beta_1 UNEM_{t-i} + \sum_{i=1}^n \beta_2 RGDP_{t-i} + \sum_{i=1}^n \beta_3 INFL_{t-i} + U_{t1} \dots \dots \dots (6)$$

$$RGDP_t = \beta_0 + \sum_{i=1}^n \beta_1 UNEM_{t-i} + \sum_{i=1}^n \beta_2 RGDP_{t-i} + \sum_{i=1}^n \beta_3 INFL_{t-i} + U_{t2} \dots \dots \dots (7)$$

$$INFL_t = \beta_0 + \sum_{i=1}^n \beta_1 UNEM_{t-i} + \sum_{i=1}^n \beta_2 RGDP_{t-i} + \sum_{i=1}^n \beta_3 INFL_{t-i} + U_{t3} \dots \dots \dots (8)$$

Where $UNEM_t$ is the unemployment rate, $RGDP_t$ is real GDP growth rate and $INFL_t$ represent inflation rate, all at current period. While $UNEM_{t-1}$, $RGDP_{t-1}$, $INFL_{t-i}$ represents nth lag period of unemployment rate, real GDP growth rate and inflation rate respectively.

β_0 = Intercept of the VAR model

β_1 , β_2 and β_3 = coefficients

U_t = error terms

Decision Rules

The VAR model is based on t-statistics and F- statistics. At 5 percent significance level, if the probability value of a particular explanatory variable is less than 5 percent, it means that the explanatory variable has significance impact on the dependent variable for the t-statistics. In the case of F-statistics, the wald-test is used to test the joint significance of the explanatory variables on the dependent variable.

DISCUSSION OF FINDINGS

The Augmented Dickey-Fuller (ADF) test revealed that real GDP growth rate is stationary at level $\{I(0)\}$, while unemployment rate and inflation rate are both stationary after first difference $\{I(1)\}$.

The optimal lag of one was selected as indicated by lag length selection criterion (Schwarz information criterion, Final prediction error and Hannan-Quinn information criterion). The result of bound test for cointegration in table 1, indicates that null hypotheses cannot be rejected because the F- statistics(0.655646) is less than upper bound value (4.85) at 5 percent critical value for case III (Unrestricted intercept and no trend) as it is found in M. H. Pesaran, Y. Shin and R.J Smith critical table. Therefore, there is no long run relationship between inflation, unemployment and real GDP growth rate in Nigeria. Similar study conducted by Fouzeia, et al. (2015) observed that there is no long run relationship between unemployment and Gross Domestic Product (GDP) in Egypt.

Table-2 the VAR estimates indicate that real GDP growth rate in the previous year does not have significant relationship with current rate of unemployment, likewise inflation and unemployment. While, last year unemployment rate has significant impact of 99.20 percent on the current rate of unemployment.

CONCLUSION AND RECOMMENDATIONS

This study examines the relationship between inflation, unemployment and economic growth in Nigeria, 1980-2014. The ARDL bound test estimates of this study revealed that there is no long run relationship between the variables studied. Likewise, VAR estimates which indicates a non-significant relationship between economic growth and unemployment. In view of the foregoing results, new fiscal measures and strategies are needed to create massive employment and income. It is ideal that government at all levels should recognize the activities of rural farmers and motivate them towards diversification in order to reduce unemployment and raise output. Agricultural loans and other farm inputs such as fertilizer should be released

on time and be made accessible to the rural farmers during farming season. To curb unemployment problems in Nigeria, access to power (electricity) through private provision and enhanced security are needed to spur domestic and foreign investment in the economy. Creation of a special bail-out fund for both private and public companies and industries that their collapse or closure have rendered their workforce jobless as a means of job creation and output expansion. Additional fiscal initiatives are needed to consolidate on the existing gains of the social intervention programme towards spurring private sector led production due its employment generation and positive externalities effect on the national economy.

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APPENDIX

Table 1: ARDL Bound Test Result

Wald Test:

Equation: Untitled

Test Statistic	Value	df	Probability
F-statistic	0.655646	(3, 26)	0.5867
Chi-square	1.966938	3	0.5793

Null Hypothesis: $C(5) = C(6) = C(7) = 0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	-0.029606	0.066660
C(6)	-0.028062	0.104469
C(7)	-0.039774	0.028623

Restrictions are linear in coefficients.

Table 2: Vector Autoregressive (VAR) Result.

System: UNTITLED

Estimation Method: Least Squares

Date: 07/26/16 Time: 06:38

Sample: 1981 2014

Included observations: 34

Total system (balanced) observations 102

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.992020	0.054956	18.05104	0.0000
C(2)	-0.049630	0.053900	-0.920779	0.3596
C(3)	-0.028941	0.022832	-1.267583	0.2082
C(4)	1.541895	0.895246	1.722315	0.0884
C(5)	0.233354	0.170918	1.365300	0.1756
C(6)	-0.295362	0.167632	-1.761969	0.0815
C(7)	-0.047107	0.071009	-0.663396	0.5088
C(8)	4.455495	2.784268	1.600239	0.1131
C(9)	-0.611123	0.366383	-1.667991	0.0988
C(10)	0.483713	0.359339	1.346121	0.1816
C(11)	0.509344	0.152216	3.346192	0.0012
C(12)	13.49351	5.968414	2.260821	0.0262
Determinant residual covariance		21648.16		

Equation: UNEM = C(1)*UNEM(-1) + C(2)*RGDP(-1) + C(3)*INFL(-1) + C(4)

Observations: 34

R-squared	0.933649	Mean dependent var	10.12353
Adjusted R-squared	0.927013	S.D. dependent var	7.656055
S.E. of regression	2.068361	Sum squared resid	128.3436
Durbin-Watson stat	1.842202		

Equation: RGDP = C(5)*UNEM(-1) + C(6)*RGDP(-1) + C(7)*INFL(-1) + C(8)

Observations: 34

R-squared	0.154576	Mean dependent var	4.489118
Adjusted R-squared	0.070033	S.D. dependent var	6.670547
S.E. of regression	6.432728	Sum squared resid	1241.400
Durbin-Watson stat	1.983028		

Equation: INFL = C(9)*UNEM(-1) + C(10)*RGDP(-1) + C(11)*INFL(-1) + C(12)

Observations: 34

R-squared	0.423242	Mean dependent var	19.90294
Adjusted R-squared	0.365567	S.D. dependent var	17.31212
S.E. of regression	13.78933	Sum squared resid	5704.368
Durbin-Watson stat	1.626036		