Impact of Unemployment and Interest Rates On Economic Growth Rate in Nigeria

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Abstract **— Study investigates the impact of unemployment and interest rates on economic growth rate in Nigeria. It employs annual data for the period spanning 1970 to 2017 of unemployment rate and different interest rates: Deposit rate, Treasury bill and Lending rate. The data for the study were sourced from the various issues of the statistical Bulletin of Central Bank of Nigeria (CBN). Unemployment rate has an upward trend while Deposit rate seems to have a downward trend. The Augmented Dickey-Fuller (ADF) tests show that unemployment rate, Deposit rate, Treasury bill and Lending rate are stationary at first differences. The results indicated that all the rates cointegrated at 5% level of significance, and as such there exist cointegrating vectors. The Vector Error Correction Model (VEC) model was applied and the coefficient of the Error Correction Term (ECT (-1)) of the unemployment model is given as -1.3998 approximately, which means that the system does not correct its previous period disequilibrium at a speed of adjustment. This indicates that the process is not converging in the long run. This is not significant which could be due to instabilities in the Nigerian economy. The estimation result of the cointegration equation (long-run relationship) of Table 6 indicates that there is a significant long-run relationship between deposit rate and unemployment rate. The result indicates that one percent increase in deposit rate is associated with a 3.14 percent increase in unemployment rate. The relationship between unemployment rate and lending rate is also significant. A one percent increase in unemployment rate is associated with a 2.21 percent decrease in leading rate and this is also same for Treasury bill with 0.56 percent increase in unemployment rate. Granger Causality tests showed that there is uni-directional causality from Deposit rate to Treasury bill (0.04), while there is non-directional causality from Lending rate to Deposit rate, Treasury bill to Deposit and Treasury bill to unemployment rate. Johansen cointegration confirmed that there is long run relationship between unemployment rate and Interest rate: Deposit rate, Treasury bill and Lending rate. It was recommended that self-employment/entrepreneurship should be encouraged to overcome unemployment.**

Keywords- ***Unemployment rate, Interest rates, Deposit rate, Treasury bill, Lending rate, Economic Growth rate.***

I. INTRODUCTION

An interest rate is the amount of interest due per period, as a proportion of the amount lent, deposited or borrowed (called the principal sum), https://en.wikipedia.org/wiki/Interest_rate. The total interest on an amount lent or borrowed depends on the principal sum, the interest rate, the compounding frequency, and the length of time over which it is lent, deposited or borrowed, (Acha and Acha 2011; 2015). While unemployment rate is a measure of the prevalence of unemployment and it is calculated as a percentage by dividing the number of unemployed individuals by all individuals currently in the labor force. https://en.wikipedia.org/wiki/Unemployment.

The maintenance of price stability remained the main focus of monetary policy, the CBN employed the Monetary Policy Rate (MPR) to anchor short-term rates (CBN, 2014). The Monetary Policy Rate (MPR) was the principal instrument used to control the direction of interest rates and anchor inflation expectations in the economy (CB Brief, 2017). The Central Bank of Nigeria (CBN) changes the official rate (currently called the monetary policy rate-MPR) to stimulate other banking rates. In Nigeria as in other developing countries, the objectives of monetary policy include unemployment, domestic price stability, adequate economic growth interest rates and external sector stability.

Phillips (1958) in his study on unemployment and rate of money wage in the British economy noted that increase in unemployment in the economy causes inflation to drop which he referred to as a trade-off between the variables. He concluded that as employment level increases, inflation rises, but as unemployment increases, inflation falls as the purchasing power of the economy becomes weaker. Okun (1962) propounded that as unemployment falls by 1%, gross domestic product increase by 3%, but this was criticized because it holds for the United States only. Terry (1998) noted in his theory "Search Theory of Unemployment" that as an individual is searching for job, firms are also searching to fill a vacant space. He

concluded that wages therefore decides for both the individual and the firm.

The Marxist theory noted that unemployment is as a result of unstable capitalist system via which unemployment rate perpetuates causing labourers to settle for fair wages. They argued that to eliminate unemployment completely, capitalism must be abolished completely, replacing it with socialism, (Olawunmi and Adedayo ,2017). The Keynesian economist holds that increased unemployment is as a result of fall in the aggregate demand in an economy. It is pertinent to note that the natural rate of unemployment results from the balance between job creation and destruction processes, reductions in unemployment and interest rates require complementing macro stimulations by microeconomic structural and institutional reforms, (https://www.cnbc.com/id/100958811).

According to Soyibo and Olayiwola (2000), an effective management of interest rate in Nigeria, the monetary authorities have adopted two major policies on interest rate. First, in the post-independence period, the policy thrust was to keep interest rates as low as possible, often below the rate of inflation (interest rate repression), to enable the government and private sector operators borrow cheaply to fast-track the process of economic growth and development. In fact, the policy thrust of the government was to promote real sector development by offering low rates of interest on loans to the sectors. Interest rate regulation during the period ensured that the spread between deposit and lending rates was maintained within the specified limits. Interest rates were largely managed or fixed below the rate of inflation in the economy. Jhingan, (2001) conceives interest as the remuneration for mere abstinence.

This study employs the use of vector error correction model to determine the impact of *unemployment* and interest rates on *economic growth in Nigeria* using a Vector Autoregressive (VAR) approach and a secondary data spanning from 1970 to 2017.

II. Literature Review

Sadiku et al. (2015) empirically examined unemployment relation with growth in FYR Macedonia using VAR approach with a quarterly based data from 2000-2012. It was observed that no negative relationship between unemployment and economic growth as propounded by Okun's Law and also no direction of causality between unemployment and economic growth.

Amassoma and Nwosu (2013) examined the impact of unemployment on productivity growth in Nigeria using an error correction modeling approach and co-integration technique to analyse the data used from 1986 to 2010. The regression estimate based on the short run and long run models showed that unemployment rate had an insignificant influence on productivity growth in Nigeria over the study period.

Muhammad, Inuwa, and Oye (2011) examined the implication of unemployment on gross domestic product in Nigeria over the period of nine years (2000-2008) using regression analysis. Findings showed that there exist an inverse relationship between unemployment and gross domestic product, which implies that as unemployment increases, gross domestic product falls.

Ejikeme (2014) assessed the link unemployment and poverty has on security in Nigeria. His study revealed that unemployment and poverty have direct links to security challenges in Nigeria.

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.

Muhammad (2014) studied the effect of inflation and unemployment on the growth of Pakistan from 1980 to 2010 using the Auto regressive distributed lag.

Taylan (2012) investigated the relationship between macroeconomic variables and economic growth in Turkey from 2000Q1 to 2010Q2 using Vector AutoRegressive Model (VAR). From his findings, it was revealed that positive shocks to growth, growth in export and inflation reduced unemployment. Also, shocks to exchange rate, interbank interest rate and money supply increased unemployment. The conformity of the results is found to go in line with Phillips curve and Okun's Law suggestion that there are negative relationship between output and unemployment and positive relationship between unemployment and inflation.

Babalola, Saka and Adenuga (2013) validates Okun's law in Nigeria using a different approach of the VAR Cointegration to compare the two models (Shortrun and Long-run) from 1980-2012.

It was observed that unemployment rate as an independent variable was positive and also positive for real GDP growth as an independent variable. These findings are contrary to Okun's law of unemployment–output relationship. Olawunmi and Adedayo (2017) in their study aimed at examining the dynamic effect of unemployment on growth in the context of Nigeria using the VAR approach to analyse the variations. They observed that the impact of unemployment vary over time as effort towards eradicating it are been made by the government in the country. The implication of the study is to inform researchers on the VAR model as an appropriate approach for dynamic analysis, to urge academicians to be more informative on the dynamic effects of unemployment in the

economy, and to provide guidance to the government on the appropriate policy to adopt to tackle the issue of unemployment and inflation in the country. This study recommends increase in government expenditure towards the enhancement of individual skills in order to reduce unemployment and inflation.

Imran and Iba (2014) examined the relationship between macroeconomic variables and unemployment in Pakistan from 1980-2010 using the VAR Approach. From their findings, it was revealed that the variables have more variance contribution to themselves when compared to other variables in the system. Inflation rate contributed to unemployment variance more as compared to economic growth, unemployment contributes more to economic growth as compared to inflation and unemployment rate has also more variance contribution to inflation as compared to the study by Olawunmi and Adedayo (2017). In other words, unemployment rate has more variance contribution in both inflation and economic growth rate.

A recent study from Zambia by Shula (2017) used regression analysis and found the negative impact between interest rate and stock price index. According to Ibrahim et al. (2014), Treasury bill acts as an alternative investment for savers and is very normal that increase in T-bill rate exhibit negative effect on interest spread. The saver have option of choosing between low savings rate and high treasury bill rate and because of competition in the money market, lenders cannot continue to lend as high as they wish but they have no option than to offer competitive saving rate to attract and sustain customer patronage. This leads to a reduction in the interest rate spread, hence the negative relation in the short run.

Rasheed (2010) analyzed the relationship between deposit interest rates and lending interest rates in Namibia. Using monthly data for the period 1992:01- 2012:12, the study employed time series techniques, namely unit root tests and the cointegration and Granger Causality. The study shows that there is no cointegration among the variables, implying that the long-run relationship between the deposit, interest rate and lending interest rate is nonexistent. This also suggests that Bank of Namibia does not have symmetric control on two variables and there is no linear relationship between them

Further, Rasheed (2010) used error correction model (ECM) to investigate interest rate determination in Nigeria. The study found out that as the Nigeria financial sector integrates more with global markets, returns on foreign assets will play a significant role in the determination of domestic interest rates.

Onyekachi and Okoye (2013) examined the impact of bank lending rate on the performance of Nigerian Deposit Money Banks between 2000 and 2010. It specifically determined the effects of lending rate and monetary policy rate on the performance of Nigerian Deposit Money Banks and analyzed how bank lending rate policy affects the performance of Nigerian deposit money banks.

The study utilized secondary data econometrics in a regression, where time-series and quantitative design were combined and estimated. Many researchers like Acha and Acha (2017), Okun (1962), Ali (2014) and Acha (2017) have worked extensively on the relationship of unemployment and interest rates independently with different factors such as gross domestic product (GDP), Economic growth, inflation, crime rate, minimum wage, and so on. Here, the study will examine the impact of unemployment and interest rates on Nigeria economic growth rate.

III. RESEARCH METHODOLOGY

This study employs annually data for the period spanning 1970 to 2017 of unemployment rate, Deposit rate, Treasury bill and Lending rate. The data for the study were sourced from the various issues of the statistical Bulletin of Central Bank of Nigeria (CBN).

The VEC model of unemployment rate, Deposit rate, Treasury bill and Lending rate are formulated as:

$$\Delta IR_t = \delta_1 + \sum_{i=1}^{p} \beta_{1i}\Delta UR_{t-i} + \sum_{i=1}^{p} \beta_{2i}\Delta DR_{t-i} + \sum_{i=1}^{p} \beta_{3i}\Delta TB_{t-i} + \sum_{i=1}^{p} \beta_{4i}\Delta LR_{t-i} + Z1^{*}EC1 + \mu_{1t} \quad (1)$$

$$\Delta DR_t = \delta_2 + \sum_{i=1}^{p} \alpha_{1i}\Delta UR_{t-i} + \sum_{i=1}^{p} \alpha_{2i}\Delta DR_{t-i} + \sum_{i=1}^{p} \alpha_{3i}\Delta TB_{t-i} + \sum_{i=1}^{p} \alpha_{4i}\Delta LR_{t-i} + Z2^{*}EC2 + \mu_{2t} \quad (2)$$

$$\Delta TB_t = \delta_3 + \sum_{i=1}^{p} \lambda_{1i}\Delta DR_{t-i} + \sum_{i=1}^{p} \lambda_{2i}\Delta TB_{t-i} + \sum_{i=1}^{p} \lambda_{3i}\Delta UR_{t-i} + \sum_{i=1}^{p} \lambda_{4i}\Delta LR_{t-i} + Z3^{*}EC3 + \mu_{3t} \quad (3)$$

$$\Delta LR_t = \delta_3 + \sum_{i=1}^{p} \theta_{1i}\Delta DR_{t-i} + \sum_{i=1}^{p} \theta_{2i}\Delta TB_{t-i} + \sum_{i=1}^{p} \theta_{3i}\Delta UR_{t-i} + \sum_{i=1}^{p} \theta_{4i}\Delta LR_{t-i} + Z4^{*}EC4 + \mu_{4t} \quad (4)$$

where, δ, β, θ and λ are the short-run coefficients, IR represents unemployment rate, DR Deposit Rate, TB Treasury Bill, LR Lending Rate, EC1, EC2, EC3 and EC4 are error correction terms and μ are the stochastic error terms.

IV. DATA ANALYSIS

The time plot of the series are provided in Fig 1.

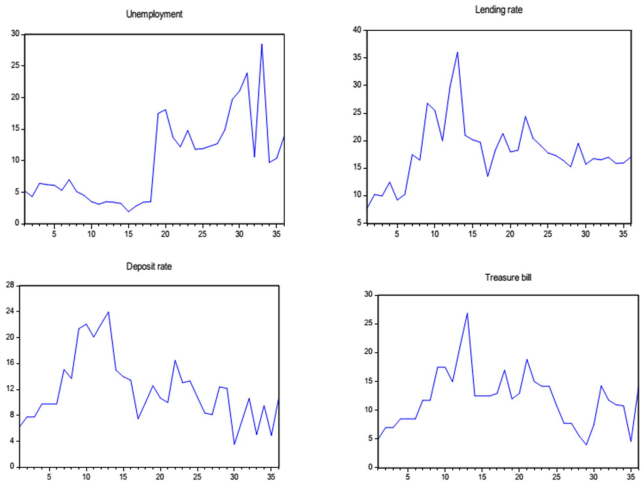

Fig 1: The time plots of Unemployment, Lending, Deposit and treasure bill rates in Nigeria.

Since most of the variables or series are non-stationary, units root tests are useful to determine the order of integration of the variables. The Augmented Dickey-Fuller (ADF) tests under trend and the intercept was used to test the stationarity of the data.

Table 1: ADF test for unit root

unemployment rate	Augmented Dickey Fuller test statistic	t-Statistic	Prob.*
	Test critical values	-7.519451	0.0000
		1% level	-4.170583
		5% level	-3.510740
		10% level	-3.185512
Lending Rate	Augmented Dickey Fuller test statistic	t-Statistic	Prob.*
	Test critical values	-2.4388410.3557	
		1% level	-4.170583
		5% level	-3.510740
		10% level	-3.185512
Deposit Rate	Augmented Dickey Fuller test statistic	t-Statistic	Prob.*
	Test critical values	-2.3015660.4247	
		1% level	-4.170583
		5% level	-3.510740
Treasury Bill		10% level	-3.185512
	Augmented Dickey Fuller test statistic	t-Statistic	Prob.*
	Test critical values	-2.700092	0.2414
		1% level	-4.170583
		5% level	-3.510740
		10% level	-3.185512

*MacKnnon (1996) one-sided p-values.

Above table is the summary of results of Augumented Dickey –Fuller test. According to (Table 1.), we conclude that there is absence of unit root according to the P-values of all the four variables as the P-values are significant. Since the values of computed ADF test-statistic of the three variables are smaller than the critical values at 1%, 5% and 10% levels of significance respectively. So, the null hypotheses can be rejected that means all the four variables do not have a unit root. From the unit root test, we conclude that the four variables are stationary at first difference.

a. Johansen test of cointegration

In Johansen test, data or variable must be non- stationary and integrated of same order. When we convert them to first difference, they become stationary. Hence Johansen Cointegration test can be applied to examine long run relationship between the variables.

Table 2: Cointegration Test Analysis result (Trace)

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.701666	142.5032	47.85613	0.0000
At most 1 *	0.627881	89.28345	29.79707	0.0000
At most 2 *	0.500819	45.78765	15.49471	0.0000
At most 3 *	0.292376	15.21708	3.841466	0.0001

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Table 3: Cointegration Test Analysis result (Maximum Eigenvalue) Unrestricted Cointegration Rank Test (Maximum Eigenvalue).

Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
0.701666	53.21979	27.58434	0.0000
0.627881	43.49580	21.13162	0.0000
0.500819	30.57056	14.26460	0.0001
0.292376	15.21708	3.841466	0.0001

Max-eigenvalue test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

The Johansson cointegration test results in table 2 above shows that there is a long run relationship between unemployment rate, Deposit rate, Treasury bill and Lending rate as the trace statistic value of 142.5032 is more than the critical value of 47.85613 and is significant as the probability value of 0.0001 is less the 0.05. Hence the null hypothesis of no long run relationship between Interest rate, Deposit rate, Treasury bill and Lending rate was rejected. In other words, they move together in the long run. Since the variables are found to be co-integrated, we can specify an error correction model and estimate. Once there is co-integrating vector, a long run relationship is concluded (Gujarati, 2004).

b. Granger Causality Test Results

As Johansen cointegration test revealed that there is long run equilibrium relationship exists between lending rate and deposit rate, the study employed Granger causality test to see whether lending rate does Granger cause deposit rate, interest rate, lending rate and deposit rate or deposit rate does Granger cause lending rate, interest rate and deposit etc. cointegration indicates that causality exists between the four variables but it fails to show us the directions of the causal relationship. Granger suggests that if cointegration exists between two variables in the long run, then, there must be unidirectional, bi-directional or non-directional.

Table 4: Results of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
D(unemployment rate) does not Granger Cause D(DEPOSITE_RATE)	44	0.03616	0.9645
D(DEPOSITE_RATE) does not Granger Cause D(unemployment rate,)		0.73860	0.4843
D(LENDING_RATE) does not Granger Cause D(DEPOSITE_RATE)	44	0.74581	0.4810
D(DEPOSITE_RATE) does not Granger Cause D(LENDING_RATE)		1.28270	0.2887
D(TREASURY_BILLS) does not Granger Cause D(DEPOSITE_RATE)	44	1.57705	0.2195
D(DEPOSITE_RATE) does not Granger Cause D(TREASURY_BILLS)		3.62603	0.0360
D(LENDING_RATE) does not Granger Cause D(unemployment rate,)	44	0.10834	0.8976
D(unemployment rate,) does not Granger Cause D(LENDING_RATE)		0.50294	0.6086
D(TREASURY_BILLS) does not Granger Cause D(unemployment rate,)	44	2.14981	0.1301
D(unemployment rate,) does not Granger Cause D(TREASURY_BILLS)		1.30427	0.2829
D(TREASURY_BILLS) does not Granger Cause D(LENDING_RATE)	44	0.90382	0.4133
D(LENDING_RATE) does not Granger Cause D(TREASURY_BILLS)		0.03928	0.9615

Granger Causality tests showed that there is uni-directional causality from Deposit rate to Treasury bill (0.04), while there is non-directional causality from Lending rate to Deposit rate, Treasury bill to Deposit and Treasury bill to unemployment rate.

c. Error correction model Results

The presence of cointegrating vectors between variables indicates a long-run relationship among the variables; therefore, the VEC model can be applied. Structural short and long-run relationships are indicated in VECM estimation.

Table 5: Error correction model (Cointegrating Equation)

Cointegrating Eq:	CointEq1
unemployment rate(-1)	1.000000
DEPOSITE_RATE(1)	3.136337 (0.61077) [5.13507]
LENDING_RATE(-1)	-2.207473 (0.63995) [-3.44944]
TREASURY_BILLS(-1)	-0.562432 (0.72219) [-0.77879]
C	8.971620

Table 6: Vector Error correction model

Error Correction:	D(UNEMPLOYMENT_RATE)	D(DEPOSITE-RATE)	D(LENDING-RATE)	D(TREASURY_BILLS)
CointEq1	-1.399781 (0.26039) [-5.37580]	0.091669 (0.06368) [1.43959]	0.180377 (0.06279) [2.87282]	0.028111 (0.05945) [0.47283]

Vector error correction model estimation result is presented in Table 6. The coefficient of the Error Correction Term (ECT (-1)) of the model is given as -1.3998 approximately, this simply implies that the system does not corrects its previous period disequilibrium at a speed of adjustment.

In line with a prior expectation, the sign of ECT (-1) coefficient is not significant but negative, indicating that the process is not converging in the long run; it could be due to some instabilities (recession) in the Nigerian economy. The estimation result of the cointegration equation (long-run relationship) of Table 6 indicates that there is a significant long-run relationship between deposit rate and unemployment rate. The result indicates that 1% increase in deposit rate is associated with a 3.14 % increase in unemployment rate.

The relationship between unemployment rate and lending rate is also significant. A one percent increase in interest rate is associated with a 2.21 percent decrease in unemployment rate, and this is also same for Treasury bill with 0.56% increase in interest rate. This result disagrees with Kamal and Umme 2015, which states that there is no long run equilibrium relationship exists between lending rate and deposit rate.

V. CONCLUSIONS

At levels, data were non stationary but after first difference they became stationary. The graphical presentations showed that unemployment rate has an upward trend while Deposit rate seems to have a downward trend, lending rate somehow become stable from 2010 towards 2017 while treasury bill appear to have an upward trend. The variables do not have a unit root.

Johansen cointegration test revealed the presence of long term relationship between the variables as the trace statistic value of 142.5032 is more than the critical value of 47.85613 and is significant as the probability value of 0.0000 is less the 0.05.

Granger Causality tests showed that there is uni-directional causality from Deposit rate to Treasury bill (0.04); this could be attributed due to inefficiencies and lack of competition, lending-deposit rate spread requires effective measures to address these weaknesses in the Nigerian economy, while there is non-directional causality from Lending rate to Deposit rate, Treasury bill to Deposit and treasury bill to unemployment rate.

The coefficient of the Error Correction Term (ECT (-1)) of the model is given as -1.3998 approximately, this simply implies that the system does not corrects its previous period disequilibrium at a speed of adjustment. In line with a prior expectation, the sign of ECT (-1) coefficient is not significant but negative, indicating that the process is not converging in the long run; it could be due to instabilities in the Nigerian economy.

The estimation result of the cointegration equation (long-run relationship) of Table 6 indicates that there is a significant long-run relationship between deposit rate and unemployment rate. The result indicates that one percent increase in deposit rate is associated with a 3.14 percent increase in unemployment rate.

The relationship between interest rate and lending rate is also significant. A one percent increase in interest rate is associated with a 2.21 percent decrease in lending rate and this is also same for Treasury bill with 0.56 percent increase in in unemployment rate.

The monetary authorities should make efforts at bridging the widened gap between lending and deposit rates to foster a moderate rise in nominal rates and stabilize inflationary pressure. This will enable self-employment/entrepreneurship to overcome the unemployment.

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