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UNEMPLOYMENT RATE AND CRUDE OIL PRICE MOVEMENT IN NIGERIA: THE NEXUS

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Abstract: *The study investigated the relationship between the unemployment rate and crude oil price movements in Nigeria using a quarterly time series data for the periods 2014q1 to 2018q4. The study adopted the Johansen co-integration and Vector Error Correction Model analysis. Estimates show that in the long-run, the crude oil price is statistically significant with a negative causal relationship with the unemployment rate at -1.0934. So as oil price rises, unemployment reduces in the country. Crude oil price is, however, statistically insignificant in the short-run. The error correction term is as expected with a negative coefficient of -0.402224 and statistically significant considering its P-value of 0.0357. This implies that the previous quarter's deviation from the long-run equilibrium is adjusted in the current quarter at a speed of 40.22%. The inverse relationship between the unemployment rate and crude oil price as portrayed by the study is not surprising because the economy thrives on proceeds from oil rent. The study recommends diversifying the economy to reduce over-reliance on oil, revitalising the manufacturing sector to increase industrialization, implementing long-term plans to curb unemployment rate, and making the lending interest rate less burdensome.*

Keywords: Crude oil price; Unemployment rate; Flow supply shocks; Flow demand shocks; VECM; Johansen cointegration.

1.Introduction

Oil is regarded as an important commodity globally since it is a major source of energy for domestic and industrial use (Umar and Abdulhakeem, 2010). To a large extent, oil has become one of the vital sources of revenue for economies and indeed, a major source of revenue for most developing economies.

Oil prices have become more volatile since World War II. The global economic fluctuations and the activities of OPEC affect the price of oil. All economies and regions globally are affected by the volatility of crude oil prices although, the said volatility originates from international market forces (Johanna, 2016).

The fluctuations in oil prices and its economic significance have been the focus of many researchers. This has given rise to varied reactions and opinions with regards to its impact on macroeconomic variables. According to Tweneboah and Adam (2008), many countries find it difficult to execute effective policymaking due to the persistent oil price shocks. The level and extent of the influence of oil price shocks on economic activity is said to vary from country to country due to differences in economic structure, energy intensity, energy mix and dependence on international energy market (Akpan, 2009).

Nigeria is one economy that thrives and depends majorly on the oil sector. Since the discovery of oil in Nigeria in 1956, it has become the main source of foreign exchange earnings and government financing. Oil constitutes

80% of revenue and 95% of export earnings, 83% of Federal government revenue and 65% of government budgetary revenues and 95% of foreign exchange earnings (CBN, 2010).

The over-dependency of Nigeria on the oil sector has, as a matter of consequence, shown the level of vulnerability of the economy to external oil price shocks or the variability of oil price in the international markets. Since the United States ceased oil importation from Nigeria in July 2014 due to the emergence of Shale oil and gas production, there has been a decline in oil price and a country like Nigeria that has over 85% of her revenue sourced from the oil sector, has had various aspects of her economy affected by the decline (Odeyemi, 2015).

There is limited research on the relationship between oil price movements and the Nigerian macroeconomic variables most especially with regards to unemployment. So, in the light of the obvious over-dependence of Nigeria on oil and its effect on economic activities, the different outcomes of the limited research on the effects of oil price shocks on the macroeconomic variables and more specifically, the dearth of research on unemployment and oil price movements in Nigeria, the study seeks to investigate the relationship between oil price movements and the unemployment rate in Nigeria.

2. Literature Review

2.1 Conceptual Framework

Unemployment Rate

Unemployment is one of the macroeconomic factors posing a critical challenge to policymakers and governments of economies. According to Maijama'a and Musa (2021), unemployment is a macroeconomic factor with social and economic consequences. So, policymakers must identify factors that contribute to the increasing rate of unemployment. Unemployment is referred to as not being in paid employment or self-employment but currently available for work during the reference period (OECD; Organisation for Economic Co-operation and Development, 2003). Britannica (2020) defines unemployment as a condition of one who is capable of working, actively seeking work, but unable to find any. The Nigerian Bureau of Statistics (NBS) (2016) defined unemployment to include persons (aged 15–64) who are currently available for work, actively seeking but are without work. The NBS emphasized that an employed person is engaged in producing goods and services, thereby contributing to the Gross Domestic Product (GDP) in a legitimate manner, which is a component of the national accounts and receives any form or amount of compensation for that activity. So, by implication, individuals making financial gains through any form of illegal activity does not constitute employment.

Unemployment is gauged by the unemployment rate (the percentage of the labour force that is out of a job). Bondarenko (2019) maintained that the unemployment rate, as a primary economic indicator, is used to measure the health of an economy. It is observed closely by policymakers since it tends to fluctuate with the business where it increases during recessions and decreases during expansions. A high unemployment rate, amongst other things, discourages foreign investments thereby, reducing the foreign direct investment inflows in the economy. It brings about untold hardship to families (Bondarenko, 2019). The rate of unemployment depends on the dynamics of demand and supply (microeconomic scale) and the macroeconomic scale (Doğrul & Soytas, 2010). The dynamics of demand and supply would entail the following;

- labour productivity
- labour wages
- level of general price and
- the values of additional factors of production.

On the macroeconomic level, sources of unemployment would include.

- the business cycles,
- the situation of the economy (recession or boom),
- level of technology,
- population changes and
- the international forces such as prices of energy, policies of the government.

Nigeria is a country characterized by the ever-increasing trend of the unemployment rate. This trend was very vital in the national and international policies formulated and implemented in the country (Maijama'a and Musa, 2021). The World Development Indicator (2020) reports an upward trend in the unemployment rate in Nigeria, where it rose from 3.6% in 1991 to 3.8% in 2001. Again, it rose from 4.31% in 2015 to 8.10% in 2019.

Oil price movement or otherwise, fluctuation is the change or the rise and fall of the oil price over some time. Wakeford (2006) opined that the price fluctuations in oil are due to changes in either the demand or supply of oil in the international market. These changes are usually associated with supply-side disturbances such as OPEC supply quotas, political disorders in the oil-rich Middle East, unfettered behaviours of non-OPEC oil-producing countries and activities of militant groups in the Niger Delta region of Nigeria (Akpan, 2009).

Oil Price Fluctuations

The oil output cut by the OPEC countries in the seventies gave rise to a wave of supply shocks that hit the global economy and thus, popularizing the analysis of oil price fluctuations. The price fluctuation in oil is measured by averaging the change in a particular year and that of the previous two years (Institute for 21st Century Energy, 2012). The global oil market has experienced continuous price fluctuations since the 1970s. Terfa and Akiri (2019) attribute this to the following.

- oil used as a political tool to determine political control and relations amongst nations
- the prejudice inherent in the regional distribution of oil resources in the Middle East
- the influence exerted on the price and supply of oil in the global market by the OPEC countries and other cartels alike.

Furthermore, Hannes and Markus (2007) added that the pressure on oil demand, especially from growing economies like China and India, contributes to oil price fluctuations. Again, geopolitical events like war and terrorism from the volatile Middle East also affects the stability of oil price globally. Such events like the 1973 Yom Kippur War followed by the Arab oil embargo of 1973–1974, the Iranian Revolution of 1978–1979, the Iran-Iraq War of 1980–1988, the Persian Gulf War of 1990–1991, the Venezuelan crisis of 2002 and the Iraq War of 2003, and the Libyan uprising of 2011 will suffice (Kilian, 2014).

The fluctuations in global oil price would mean different things to different countries. All things being equal, an increase in oil price is a welcomed development for an oil-exporting country while it is not for an oil-importing

economy. The reverse is obtainable when the price of oil goes down (Terfa and Akiri, 2019). The Nigerian economy is known for its over-reliance on oil. So, as a net oil-exporting country, there is evidence relating to the transmission channels through which oil price fluctuations affect the macroeconomic activities, especially unemployment, in the country (Maijama'a and Musa, 2021). In other words, the increase in oil prices leads to the overall economic growth and development through the increase in government revenue, decline in consumer prices, increase consumer spending, exchange rate and interest rate stability. However, there is an exchange rate crisis and a fall in government revenue once oil prices go down which, poses adverse effects on the manufacturing and services industries. By extension, the economy is affected negatively through the growing inflation, waning investment, job loss and devaluation of the Naira that is caused by the fall in oil price (Obasi, 2016).

2.2 Theoretical Framework

Based on theoretical evidence, oil price changes influence economic activity through both supply and demand channels (Park, 2007).

Flow Supply Shocks

A flow supply shock is a sudden and unexpected change in oil prices. Flow supply shocks can be negative, resulting in a decreased supply, or positive, yielding an increased supply. A positive supply shock increases output causing prices to decrease due to a shift in the supply curve to the right, while a negative supply shock decreases production causing prices to rise. Supply shocks can be created by any unexpected event that constrains output or disrupts the supply chain, including natural disasters and geopolitical developments such as acts of war or terrorism. Crude oil is most vulnerable to negative supply shocks because most of the world's supply comes from the volatile Middle East region. Potential examples of such unexpected and geopolitical events include the 1973 Yom Kippur War followed by the Arab oil embargo of 1973–1974, the Iranian Revolution of 1978–1979, the Iran-Iraq War of 1980–1988, the Persian Gulf War of 1990–1991, the Venezuelan crisis of 2002 and the Iraq War of 2003, and the Libyan uprising of 2011 (Kilian, 2014).

However, Kilian (2014) identified three problems with this explanation. The first being that it frequently does not fit the data. He pointed out that the Arab-Israeli War of 1973 did not constitute a shock to the flow of crude oil supplies, because the war was not fought on the territory of oil-producing economies and no oil production facilities were damaged. Again, the Arab oil embargo of 1973–1974, in contrast, did affect the flow of oil supplies, but the embargo decision was taken explicitly concerning the state of the US economy. Furthermore, the timing of the Iranian Revolution does not march since the oil price surge started only in May 1979 after the exogenous oil supply disruption in Iran was over. Finally, the price of crude oil hardly increased amidst the flow supply disruptions associated with the outbreak of the Iran-Iraq war in late 1980, the Venezuelan crisis of late 2002, and the Iraq war of early 2003.

The second problem identified was that more formal regression analysis confirms that quantitative measures of exogenous oil supply shocks associated with political events in the Middle East invariably have little predictive power for the percentage change in the real price of oil.

The third problem identified was that numerous subsequent empirical studies show that most major oil price increases since late 1973 have had an important endogenous component associated with the global business cycle.

Flow Demand Shocks

A flow demand shock is a sudden and surprising event that dramatically increases or decreases demand for oil. A positive demand shock is a sudden increase in demand, while a negative demand shock is a decrease in demand. Both a positive demand shock and a negative demand shock will affect the prices of oil. A demand shock is a large but transitory disruption of oil prices caused by an unexpected event that changes the perception and level of demand for oil. These are shocks to oil demand for immediate consumption associated with fluctuations in the global business cycle.

According to Fattouh and Economou (2019), flow demand shocks are associated with the largest and persistent impact on oil price changes. Kilian (2014) has said that there is evidence that flow demand shocks associated with the global business cycle were a primary determinant not only of the 1973–1974 oil price increase but of most major oil price increases. He said that because oil is a necessary ingredient for the modern economy, flow demand for oil increases as the global economy expands. Hence, it is not surprising that the real price of oil, all else equal, depends on the state of the global economy. In 2008, $85/b out of the total $106/b oil price collapsed within six months (between June to December 2008). This is attributed to negative flow demand shocks and is evidence of the extent to which flow demand shocks can impact the market (Fattouh and Economou, 2019).

2.3 Empirical Evidence

Umar and Abdulhakeem (2010) examined the impact of crude oil price changes on four key macroeconomic variables; real GDP, money supply, unemployment and consumer price index using Vector Autoregressive (VAR) Model. The study showed that oil price has a significant impact on real GDP, money supply and unemployment.

Kurnysheva and Burakov (2017) studied the case of Russia based on data for 1990 – 2016 using the Vector Error Correction Model (VECM). The study revealed that a positive oil price shock leads to an increase in the aggregate level of wages in the economy and employment growth. A negative oil price shock leads to a slowdown in the growth of the aggregate level of wages and an increase in the average level of unemployment.

Babajide and Soile (2015) investigated the impact of oil price shocks and their transmission channels to selected macroeconomic variables which served as proxies for economic activities in Nigeria using quarterly data from 1980Q1 to 2014Q4. Applying the Vector Autoregressive (VAR) framework, the result of the study showed that oil price shocks have a negative impact on nearly all the variables used in the study.

Johanna (2016) used autoregressive distributed lag (ARDL) approach to test for symmetric effects of oil price changes on employment in the oil industry and employment in non-oil industries in Alaska with a quarterly data for the period 1987-2015. The long-run results show a strong positive correlation of crude oil prices and oil-industry employment and negative correlation between crude oil prices and employment in the non-oil industry in Alaska.

Ordóñez, Sala and Silva (2010) examined the impact of real oil price shocks on labour market flows in the U.S using smooth transition regression (STR) models. The study finds that these shocks are an important driving force of job market flows. Again, the job-finding probability is the main transmission mechanism of such shocks. Furthermore, they bring a new amplification mechanism for the volatility and should thus be seen as complementary to labour productivity shocks.

Using annual data from 1970 to 2007 for Indonesia, Rosyadi (2009) analyzed the effects of oil price on output using the VAR modelling approach showed that there is a cointegration vector which indicated a long-run relationship between oil price and key macroeconomic variables – real gross domestic product (constant 2000), real oil price, general government final consumption expenditure (constant 2000) and trade value (the value of export and import). The result showed oil prices influence GDP significantly in the short run but negatively in the long run.

3. Methodology

3.1 Data

The study employed a quarterly time series data from 2014Q1 to 2018Q4 to investigate the relationship between crude oil price movements and the unemployment rate in Nigeria. The unemployment rate, crude oil price (spot price of Bonny Light), lending interest rate and all share index for the period under study were used as variables. The data mentioned are secondary and were sourced from the National Bureau of Statistics and Central Bank of Nigeria 2019 statistical bulletin.

Methodology

For the study, the following model was specified in log form;

$$logunemp = \beta_0 + \beta_1 logcoprice + \beta_2 loglir + \beta_3 logasi + \varepsilon_t \quad (1)$$

Where logunemp = log of unemployment rate

logcoprice = log of crude oil price

loglir = log of lending interest rate

logasi = log of all share index

β_0 = intercept term

β_1 - β_3 = coefficients of variables

ε_t = error term

3.2 Unit Root Test

In considering the properties of time series, a unit root test must be conducted to prevent spurious regression results. This test is to establish whether the variables are integrated of order I(0) or I(1) or both. Conventionally, a unit root test is first performed in an econometric analysis (Shrestha & Bhatta, 2018). For this purpose, the study employed the Phillip-Perron Unit Root test.

The Phillip-Perron (PP) Unit root test was proposed by Phillips and Perron (1988). They propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation;

$$\Delta y_t = \alpha y_{t-1} + x_t \delta + \varepsilon_t \quad (2)$$

where α = p – 1, x_t = optional exogenous regressors which may consist of constant or a constant and trend, δ = parameter to be estimated and ε_t = white noise. It modifies the t-ratio of the α coefficient in equation (2) so that serial correlation does not affect the asymptotic distribution of the test statistic. The PP test is based on the statistic:

$$F_\alpha = t_\alpha\left(\frac{\gamma_0}{f_0}\right)^{\frac{1}{2}} - \frac{T(f_0-\gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s} \quad (3)$$

Where $\hat{\alpha}$ is the estimate, t_α the t-ratio of α, $se(\hat{\alpha})$ is the coefficient standard error and s is the standard error of the test regression. γ_0 is calculated as $(T-k)s^2/T$. Where k is the number of regressors. f_0 is an estimator of the residual spectrum at frequency zero.

3.3 Johansen Co-integration Test

The justification for applying this test would stem from the outcome of the unit root test. It is most appropriate for variables that are all integrated of order 1 (stationary at first difference). The Johansen approach to co-integration is used to investigate the existence of co-integration among variables. The Johansen co-integration test is based on the Vector autoregressive model (VAR) and it uses the Maximum Eigenvalue test and the Trace test to determine the number of co-integration vectors. The Johansen's methodology takes off from a VAR of *p* which is given by;

$$y_t = A_1 y_{t-1} + \cdots + A_p y_{t-p} + Bx_t + \varepsilon_t \quad (4)$$

Where y_t is a *k*-vector of non-stationary I(1) variables, x_t is a *d*-vector of deterministic variables, and ε_t is a vector of innovations. The VAR can be rewritten as;

$$\Delta y_t = \prod y_{t-1} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-1} + Bx_t + \varepsilon_t \quad (5)$$

Where;

$$\prod = \sum_{i=1}^{p} A_i - I \text{ and } \Gamma_i = -\sum_{j=i+1}^{p} A_j \quad (6)$$

If the coefficient matrix Π has reduced rank $r < k$, then there exist $k \times r$ matrices α and β each with rank r such that $\prod = \alpha\beta'$ and $\beta' y_t$ is stationary. r is the number of cointegrating relations (the cointegrating rank), the elements of α are known as the adjustment parameters in the vector error correction model and each column of β is a cointegrating vector. It can be shown that for a given r, the maximum likelihood estimator of β defines the combination of y_{t-1} that yields the r largest canonical correlations of Δy_t with y_{t-1} after correcting for lagged differences and deterministic variables when present. Johansen proposes two different likelihood ratio tests of the significance of these canonical correlations and thereby the reduced rank of the Π matrix. These tests are the trace test and maximum eigenvalue test as shown in equations (7) and (8);

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln(1-\lambda_i) \quad (7)$$

$$J_{max} = -T\, In(1-\lambda_{r+1}) \quad (8)$$

Here T is the sample size and λ_i is the ith largest canonical correlation. The trace test tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of n cointegrating vectors. The maximum eigenvalue test, on the other hand, tests the null hypothesis of r cointegrating vectors against the alternative hypothesis of $r+1$ cointegrating vectors. The test hypothesis is as follows.

H_0: There is no co-integration and H_1: There is a cointegration

The decision criterion is to reject H_0 if the Trace and Maximum Eigenvalue values are greater than the tabulated 5% critical value.

3.4 The Vector Error Correction Model (VECM)

The Vector Error Correction Model (VECM) is applied once co-integration is detected amongst the variables. It is a restricted VAR designed for use with nonstationary series that are known to be cointegrated. This is applied to evaluate the short-run dynamics of the model. The VECM has cointegration relations built into the specification so that it restricts the long-run behaviour of the endogenous variables to converge to their cointegrating relationships while allowing for short-run adjustment dynamics. The cointegration term is known as the error correction term (ECT). A negative and significant coefficient of the ECT indicates that a deviation from long-run equilibrium is corrected gradually through a series of partial short-run adjustments. The equation form for VECM is stated as follows;

$$\Delta Y_t = \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta Y_{t-i} + \sum_{j=1}^{k-1} \eta_j \Delta X_{t-j} + \sum_{m=1}^{k-1} \xi_m \Delta R_{t-m} + \lambda ECT_{t-1} + u_t \quad (9)$$

The study will check for structural stability and fitness of the model.

4. Analysis and Results

The study utilized the Phillip-Perron Unit Root test to check for stationarity among the variables. The result of the test is presented in Table 1.

Table 1: Phillip-Perron Unit Root

Variable	Level			First Difference		
	Intercept	Trend & Intercept	I(d)	Intercept	Trend & Intercept	I(d)
logunemp	-0.1400	-3.6089	I(d)	-6.7813	-6.5866	I(1)
logcoprice	-1.9849	-1.3887	I(d)	-3.3932	-4.3198	I(1)
loglir	-0.2266	-1.8825	I(d)	-5.1626	-5.9346	I(1)
logasi	-1.7207	-1.5431	I(d)	-3.2378	-3.2161	I(1)

Source: Authors' computation using Eviews 10

As seen from the test, all the variables are non-stationary at levels. However, at first difference, they are all stationary. In other words, all the variables are integrated of order I(1) which gives us reason to test for cointegration. It is, therefore, appropriate to apply the Johansen approach to cointegration as all the variables are of order I(1). It is then necessary to determine the optimal lag.

Table 2: Lag Order Selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.75582	NA	3.09e-07	-3.639535	-3.441675	-3.612253
1	78.15694	59.80163*	1.95e-08*	-6.461883	-5.472581*	-6.325471
2	95.87446	17.71752	2.25e-08	-6.652718*	-4.871975	-6.407178*

Source: Authors' computation using Eviews 10

As it is pertinent to determine the appropriate lag structure before further analysis, Table 2 reports the lag selection criteria. The criterion for selection will be based on Akaike Information Criterion (AIC) and the result shows lag order at 2. Further analysis will be done based on lag 2. The result of the Johansen Cointegration test is presented in Table 3;

Table 3: Johansen Cointegration Test:

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.995237	146.7804	47.85613	0.0000
At most 1 *	0.885789	55.88405	29.79707	0.0000
At most 2 *	0.672545	18.99905	15.49471	0.0142
At most 3	0.001187	0.020184	3.841466	0.8869

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.995237	90.89632	27.58434	0.0000
At most 1 *	0.885789	36.88500	21.13162	0.0002
At most 2 *	0.672545	18.97887	14.26460	0.0083
At most 3	0.001187	0.020184	3.841466	0.8869

Max-eigenvalue test indicates 3 cointegrating eqn(s) at the 0.05 level

Source: Authors' computation using Eviews 10

Based on the decision criteria of this test, where H_0 is rejected if the Trace and Max-eigenvalue statistics > 5% critical value, it is evident from Table 3 that the Trace and Max-Eigenvalue test all indicate 3 cointegrating equations at the 0.05 level. This implies that there is cointegration among the variables. The existence of cointegration implies a long-run relationship between variables.

Table 4: Normalized Cointegration

Normalized cointegrating coefficients (standard error in parentheses)			
LOGUNEMP	LOGCOPRICE	LOGLIR	LOGASI
1.000000	1.093372	-11.37862	-0.655595
	(0.04161)	(0.24674)	(0.07082)

Source: Authors' computation using Eviews 10

Table 4 reports the normalized co-integration coefficients. The Johansen's normalized co-integration shows that in the long-run, logcoprice, loglir, and logasi are statistically significant at 1% significance level with coefficients of 1.0934, -11.379, and -0.6556 respectively. It is pertinent to note that the result of the normalized co-integration is interpreted in reverse order (Adeleye, 2018). This implies that logcoprice has a negative impact while loglir and logasi all have a positive impact on logunemp, on average ceteris paribus. So, a 1% increase in crude oil price is associated with a 1.09% decrease in the unemployment rate whereas a 1% increase in the lending interest rate and all share index is associated with an 11.38% and 0.66% increase in the unemployment rate.

The Vector Error Correction Model (VECM) is applied to determine the dynamism of the model in the short-run. Table 5 reports the result of the VECM.

Table 5: Vector Error Correction Model Estimates

		Coefficient	Std. Error	t-Statistic	Prob.
C(1)	CointEq 1	-0.402224	0.170099	-2.364654	0.0357
C(2)	D(logunemp(-1))	-0.381888	0.220228	-1.734057	0.1085
C(3)	D(logcoprice(-1))	0.287566	0.260962	1.101942	0.2921
C(4)	D(loglir(-1))	-2.965493	1.341803	-2.210081	0.0473
C(5)	D(logasi(-1))	0.054689	0.367375	0.148864	0.8841
C(6)	C	0.134539	0.035419	3.798497	0.0025

R-squared	0.482788	Mean dependent var	0.065066
Adjusted R-squared	0.267283	S.D. dependent var	0.137168
S.E. of regression	0.117415	Akaike info criterion	-1.185009
Sum squared resid	0.165434	Schwarz criterion	-0.888218
Log likelihood	16.66508	Hannan-Quinn criter.	-1.144085
F-statistic	2.240264	Durbin-Watson stat	2.025042
Prob(F-statistic)	0.117150		

Source: Authors' Computation using Eviews 10

In the short-run, logcoprice and logasi have a positive but not significant relationship with logunemp. It can, therefore, be inferred that crude oil price and all share index has no causal effect/relationship with the unemployment rate in the short run. loglir has a significantly negative relationship with logunemp. In other words, with a coefficient of -2.9655 and at a 5% significance level, the result shows that a 1% increase in lending interest rate tantamount to a 2.97% decrease in the unemployment rate on average ceteris paribus.

The error correction term (ECT) represented by CointEq 1 measures the speed at which prior deviations from the equilibrium are corrected in the current period. The ECT in Table 5 is as expected with a negative coefficient of -0.402224 and statistically significant at 5% significant level. This implies that the previous quarter's deviation from the long-run equilibrium is adjusted in the current quarter at a speed of 40.22%. The significance of the ECT also confirms a long-run causal relationship in the model.

Table 6 reports the diagnostic and stability tests employed in this study.

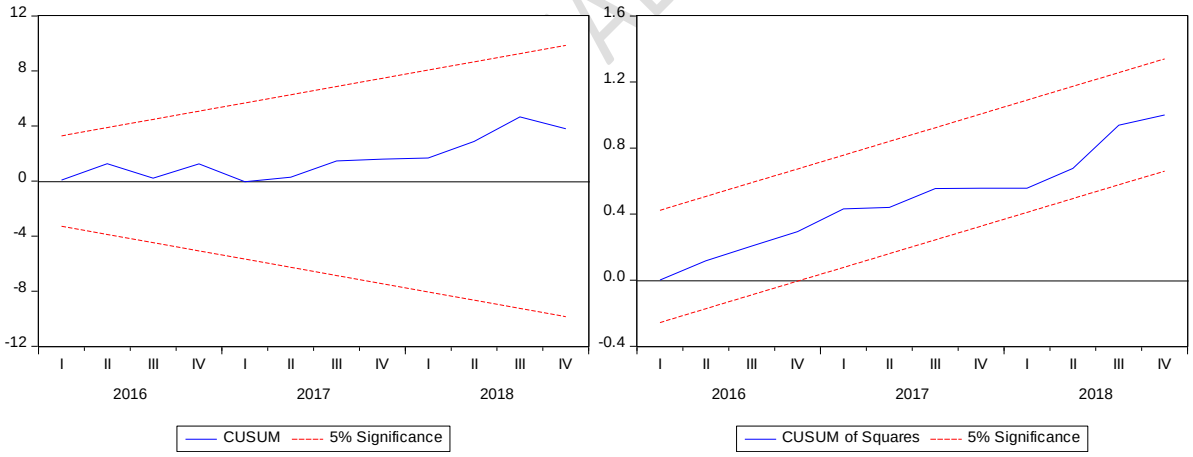
Table 6: Summary of Diagnostic Tests

Diagnostic/Stability Test	P-value	Null Hypothesis	Decision Criteria	Result
Breusch-Godfrey Serial Correlation LM Test	0.8934	No Serial Correlation	Reject H_0 if P<0.05	No Serial Correlation
Breusch-Pagan-Godfrey Heteroskedasticity Test	0.1361	No Heteroskedasticity	Reject H_0 if P<0.05	No Heteroskedasticity
CUSUM Stability Test				Model is Stable
CUSUMSQ Stability Test				Model is Stable

Source: Authors' compilation from Eviews 10 Computation

The model's residuals are fit and normally distributed owing to the outcome of the Breusch-Godfrey Serial Correlation LM Test, Breusch-Pagan-Godfrey Heteroskedasticity Test, the Cumulative Sum of Recursive Residuals (CUSUM) test, and the Square of Cumulative Sum of Recursive Residuals (CUSUMSQ) test for structural stability. The results from Table 6 show that there are no serial correlation and heteroskedasticity. The CUSUM and CUSUMSQ stability tests indicate that the model is stable. This is represented in Fig 2.

Fig. 2: CUSUM and CUSUMSQ Test



Source: Authors' computation using Eviews 10

4.1 Conclusion

The study investigated the relationship between the unemployment rate and crude oil price movements in Nigeria from 2014q1 to 2018q4. The Trace and Maxeigenvalue statistics of the Johansen cointegration test indicated evidence of long-run relationship among the variables used for the study. As indicated by the Normalized cointegration coefficients, the study showed a negative and significant relationship between the unemployment rate and crude oil price where a 1% increase in crude oil price is associated with a 1.09% decrease in the unemployment rate in long-run. More so, lending interest rate and all share index have a positive and significant relationship with the unemployment rate in the long-run where a 1% increase in lending interest rates and all share index is associated with an 11.38% and 0.66% increase in unemployment rate respectively.

However, in the short-run, as depicted by the VECM, crude oil price and all share index had no causal effect/relationship with unemployment rate whereas, the lending interest rate has a significantly negative relationship with unemployment rate with a coefficient of -2.9655.

Considering the over-dependency of the Nigerian economy on the oil, the inverse relationship between the unemployment rate and crude oil price as portrayed by the study is not surprising because the economy thrives on proceeds from oil rent. Revenue from oil creates more room for wealth distribution through salaries, wages, and job creation. So as oil price rises, unemployment reduces in the country. This study conforms with Umar and Abdulhakeem (2010).

4.2 Recommendation

In the light of the findings, the study proffers the following recommendations.

i. The Federal Government should consider embarking on a paradigm shift from a mono-economy to a more diversified economy. In other words, other avenues for wealth creation for the economy should be exploited in order to reduce the over-reliance on oil proceeds.
ii. Issues bedeviling the manufacturing sector should be sorted out to increase industrialization. More jobs would be created.
iii. The government should devise and implement long-term plans to curb unemployment rate.
iv. The high lending interest rate should be addressed so as to allow industrialists and entrepreneurs easy access to funds to aid in technological improvement, expansion of businesses and increase productivity. This will also boost employment rate.

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