Testing Philip's Curve in Nigeria: An Empirical Investigation (1981-2018)

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ABSTRACT

This study examined the relationship between unemployment and inflation in Nigeria between the period of 1981 and 2018 employing various techniques of econometric analysis. The study was guided by two major objectives: to estimate the status of long run relationship existing between unemployment and inflation in Nigeria and to ascertain whether Phillips assertion of negative relationship between unemployment and inflation holds in Nigeria. The variables used in the study are unemployment rate, inflation rate, Gross Domestic Product (GDP) and Total Government Expenditure. The study employed ARDL models after conducting unit root tests using ADF which indicates the mixed order of integration such as order zero and one, but none of the variables is integrated of order two. The ARDL-Bund test results of the study indicated that unemployment and inflation are cointegrated at the long run, while the ARDL long run result indicates that inflation was statistically significant and also negatively related unemployment in the country. The result further shows that total government expenditure and economic growth respectively were statistically significant to influence unemployment positively in the country. The researcher strongly recommends firstly that the government through the CBN should create policies that will regulate inflation rate in a way that it will encourage domestic savings in the country. Based on these findings above, the researcher thereby recommend that the policy makers should choose the best combinations of unemployment rate and inflation rate that best suit the economy for optima production and also the government should diversify her economy in order to increase her production and also create employment opportunities in the country in order to reduce the unemployment rate in the country.
Keywords: Unemployment, Inflation, Government expenditure, Nigeria, Philips curve

INTRODUCTION

Unemployment has been categorized as one of the serious impediments to social progress and it occurs when those who are expected and legally qualified and physically and willing to work given the prevailing wage structure are indeed not working. Apart from representing a colossal waste of a country's manpower resources, it generates welfare loss in terms of lower output thereby leading to lower income and well-being [1]. Unemployment is a very serious issue in Africa and Nigeria in particularly [2]; [3]. The need to avert the negative effects of unemployment has made the tackling of unemployment problems to feature very prominently in the development objectives of many developing countries.

Inflation on the other hand, is a malady as well as pervasive economic phenomenon whose effects are felt to differing degree by every citizen. Inflation is defined as a generalized increase in the level of price sustained over a long period in an economy [4].

Undoubtedly, parts of macro-economic goals which the government strives to achieve are the maintenance of stable domestic price level and full employment. Economic performance is judged by three broad measures; unemployment rate, inflation rate and growth rate of output [5]. Central to the social and economic life of every country is the issue of unemployment and inflation. The existing literature refers to inflation and

unemployment as constituting a vicious circle that explains the endemic nature of poverty in developing countries.

Over the years there have been a number of economists trying to interpret the relationship between the concepts of inflation and unemployment. Prior to the emergence of what become unemployment and inflation trade-off or Phillips curve in 1958, unemployment and inflation were considered and treated in economics as distinct subject [6]. Keynes for instance described inflation as excess of expenditure over income at full employment level, we contended that the greater expenditure, the larger the inflationary gap and the more rapid the inflation. As for unemployment Keynesian economics hold that an increase in employment reduces income, which reduces consumption or investment. Classical economists view inflation as alternation in money supply. They believed that when money supply goes up, the price level of various commodities goes up as well. They view employment as natural rate of unemployment which is also called equilibrium level of unemployment in a particular economy. [7] described inflation as excess of expenditure over income at full employment level. As for unemployment Keynesian economics hold that it occurs when there is a fall in aggregate demand [8]. Hence an increase in unemployment reduces income, which reduces consumption or investment [9]. The monetarist on the other hand, explained inflation in terms of excessive growth of money supply relative to real output. Their view on unemployment however is framed with Milton Friedman's permanent income hypothesis (PIH) which states that a reduction in employment and curve receipts only affects output to extend that the anticipated income declines. Each school of thought offered its own policy solutions. There were however, no major attempts made to examine inflation and unemployment simultaneously.

In 1958, following the introduction of Phillip curve by A.W. Phillips, the traditional economics began to examine unemployment and inflation simultaneously, thereby postulating a trade-off between inflation and unemployment such that a lower inflation rate must be willing to put up higher level of unemployment and vice-versa. However, economists such as [10] [11] disapproved Phillips curve thesis stating that the trade-off between unemployment and inflation only existed in the short run and that in the long run, the Phillips curve is vertical and this led to introduction of natural rate hypothesis. The Nigerian experience of unemployment and inflation crises was delayed until the early and mid-1980s with collapse of oil price on which the economy has become dangerously dependant on. Before 1980s, previous records showed that the Nigerian economy were able to provide jobs for its increasing population and was able to absorb considerable imported labour in the scientific set-up. The wage rate compared favourably with international standards, the inflation rate was moderated and there was relatively industrial peace in most industrial sub-group. The oil boom in the 1970s led to the mass migration of youths into urban areas seeking to get work. However, following the recession experienced in the 1980s, the available data revealed that, the problem of unemployment started to manifest, precipitating the introduction of the Structural Adjustment Programme (SAP), the rapid depreciation of the naira exchange rate and inability of most industries to import the raw materials required to sustain their output levels.

A major consequences of rapid depreciation of naira was the sharp rise in general price level (inflation), leading to a significant decline in aggregate demand. Consequently, industries start to accumulate unintended inventories and as a rational economic agent, the manufacturing firms started to rationalize their market price. With the simultaneous rapid expansion in the educational sector, new entrants into the labour market increased beyond absorptive capacity of the economy. However, the negative hypotheses which depicted the coexistence of unemployment and inflation in the economy as evidenced by Philips (1958) was based on data and information from the western world

which may have little or no applicability in Nigeria. This therefore provide the basis for the study of the relationship between unemployment and inflation based on data source within the Nigerian economy so as to formulate a theory that can best explain the Nigerian unemployment and inflation situation. This study would address the above problem in Nigerian way with the aim of finding lasting solution to unemployment and inflation in country.

Statistically, there has been a regular trend in the growth movement of inflation and unemployment rate in Nigeria over the years which calls for adequate attention and research. According to statistics provided by the National Bureau of Statistics (NBS) and International Financial Statistics, between 1981 and 1990, unemployment rate averaged 4.4 percent with inflation rate standing at 29 percent. Unemployment rate drifted upwards to 10.4 percent between 1991 and 2000 while inflation rate declined to 19.4 percent on average. Similarly, between 2001 and 2010, unemployment rate further increased to 12.7 percent on average while the rate of inflation during the same period declined to 8.52 on average. Unemployment rate however reached an all-time height of 24.9 percent in the year 2014 with inflation standing at 12.2 percent (NBS, 2015).

Despite the above structural analysis, the Nigerian economy has remained largely underdeveloped despite the huge human and natural resources. The per capita income is low, unemployment and inflation rates are high as evidenced by the country's inability to attain single digit inflation despite the sporadic unemployment rate in the country [12]. There are many socio-economic challenges. This study is necessary given the conflicting theoretical postulations and empirical findings. It is expected that accurate knowledge of the exact relationship between inflation and unemployment in Nigeria will enable policy makers put up policies aimed at tackling some of the economic problems inherent in the Nigerian economy. The main thrust of this study is therefore to determine empirically whether Phillips curve exists in Nigerian economy between 1981 and 2018. In the light of the foregoing analysis, the research work will be guided by the following questions.

- Is there any significant trade-off relationship between inflation and unemployment in Nigeria economy?
- What is the significant impact of economic growth on unemployment rate in Nigeria?
- Does total government expenditure have any significant effect on unemployment rate in Nigeria?

Objectives of the Study

The general objective of this study is to examine if there is any trade-off relationship between unemployment and inflation in Nigeria within the period of study. However, the following specific objectives would be achieved:

To ascertain whether Phillips assertion of negative relationship between unemployment and inflation holds in Nigeria.

To find out the significant impact of economic growth on unemployment rate in Nigeria.

To determine the effect of total government expenditure on unemployment in Nigeria.

The study will be guided by the following hypotheses:

There is no significant trade-off relationship between inflation and unemployment in Nigeria.

There is no significant impact of economic growth on unemployment in Nigeria.

There is no effect of total government expenditure on unemployment in Nigeria.

LITERATURE REVIEW

Theoretical Literature

In the ordinary parlance, unemployment can be viewed as a situation where people who are up to the age of working and are skilled and willing to take up such a job but cannot find one. According to [13], unemployment is the difference between the stock of labour at current wage rate and working conditions and the amount hired at these levels. [14] simply defined unemployment as a situation in which people who are willing to work at the prevailing wage rate are unable to find jobs. According to [15], unemployment is conceptualized as a situation where a worker or workers are involuntary out of work. The classical economists defined unemployment as excess supply of labour over demand which is caused by adjustment in real weal [16]. In others words, no matter how unemployment is defined the underlying philosophy is that those who are up to age and expected to work are indeed not working [17].

Inflation can be simply defined as a situation whereby too much money is chasing few goods. It can also be defined as persistent increase in the general price level of goods and services over a period of time. [18] defined inflation as a situation of general rising of price level of goods and service over a given period of time. In the word of [19], "inflation is always and everywhere a monetary phenomenon and can be produced only by a more rapid increase in the quantity of money than output". Inflation is commonly measured using consumer price index (CPI). For the purpose of achieving the objectives of this study, it is necessary to review some earlier work in this subject that would provide us with adequate theoretical and empirical background for research study. The theories include:

Classical Theory of Unemployment

The classicalists were the school of thought that emphasized the role of money in explaining short term changes in National income. The fundamental principle of classical theory is that the economy is self-regulating [20]. Traditionally, this theory has been looked upon in terms of aggregate. Their view was that involuntary unemployment was a short term phenomena resulting from discrepancy between the price level and wage level. Hence, unemployment was the result of high real wages [21]. In the long run, the wage level in the classical view would be reduced and there would be no unemployment except for frictional/search unemployment caused by time delay between quitting one job and starting another. This school opined that problem of urban unemployment is traceable to the fault of workers and the various trade union power, as they believed strongly in the theory of demand and supply. Consequently the school argued that the demand for too high wages of worker without a corresponding increase in productivity renders product costly thereby discouraging competitiveness among local industry and industries [22]. The implication of this is the reduction of sales, which further leads to mass retrenchment of workers resulting in unemployment.

Keynesian Theory of Unemployment

The Keynesian theory or cycle unemployment also known as demand deficient unemployment occurs when there is low aggregate demand in the economy. It got its name because it varies with the business cycle though it can also be persistent as during the great depression of 1930's [23]. Cyclical unemployment rises during economic down turns and falls when economy improves. [24] argued that this type of unemployment exists due to inadequate effective demand. As demand for most goods and services falls, less production is needed and given that wages do not fall to meet the equilibrium level, mass unemployment results [25]. The Keynesian framework postulates that increase in employment, capital stock and technological change are largely endogenous. Thus the growth of employment is demand determined and that the fundamental determinants of long term growth of output also influence the growth of employment. In the Keynesian theory, employment depends upon effective demand which result in increased output, output creates income,

and income provides employment. Thus he regards employment as a function of income. Effective demand depends on aggregate supply and demand function. The aggregate supply depends on physical or technical conditions which do not change in the short run; thus it remains stable. Keynes concentrated on aggregate demand function to fight depression and unemployment. Thus employment depends on aggregate demand which in turn is determined by consumption demand and investment demand. According to [26], employment can be increased by increasing consumption and investment. Consumption depends on income; c(Y) and when income rises savings also rise. Consumption can be increased by raising the propensity to consume in order to increase income and employment but the psychology of the people (taste, habit, etc.) which are also constant in the short run. Therefore the propensity to consume is stable. Employment thus depends on investment.

Classical Theory of Inflation

The classical economists anchored their postulations on the quantity theory of money. In its simplest form, the theory states that the general price level in the economy depends on the supply of money [27]. The central argument of the classical postulation is that if money supply increases in the economy, its impact will only be felt by the nominal variables(price and wages) while the real variables (output) will remain unchanged, a concept usually referred to as the "classical dichotomy". [28] expounded his famous equation of exchange in his book "the purchasing power of money". According to this theory, quantity of money is the main determinant of the price level or value of money. Any change in the quantity of money brings about a proportionate change in the price level. [29] explained his theory using the equation of exchange here $MV = PQ$

Where:M= Money supply or money stock,

V = Velocity of money circulation, P = Average price level, Q=Quantity of items traded

Fisher did not disagree with Bodin's earlier assertion. He simply added that the more money changes hand, the more the quantity of money in circulation and consequently the more the rate of inflation. Hence, if ₦100 changes hand 10 items, it is equivalent to ₦1000. The Cambridge equation focuses on money demand instead of money supply. The theory also differs in explaining the movement of money. In the classical version, money moves at a fixed rate and serves only as a medium of exchange while in the Cambridge approach, money act as a store of value and its movement depends on the desirability of holding cash. The Cambridge economists argued that a certain portion of the money supply will not be used for transaction, instead it will be held for the convenience and security of holding cash. This portion of cash is commonly represented by k. a proportion of national income that people desire to hold in money balances. In this version, the demand for money (MD) depends on national income (y) so that the higher the level of national income, the more money balances people will require to hold in order to finance their transactions.

The Keynesian Theory of Inflation

The Keynesian opposed the classical view of direct and proportional relationship between the quantity of money and prices. According to this school, the relationship between changes in the quantity of money is non- proportional and indirect, through the rate of interest [30]. The strength of the Keynesian theory is its integration of monetary theory on the other hand and the theory of output and employment through rate of interest on the other hand. Thus when the quantity of money increases, the rate of interest falls, leading to an increase in the volume of investment and aggregate demand thereby raises output and employment. Keynesians see a link between the monetary sector of the economy and economic phenomenon that describes equilibrium in the goods and money market. Equally important is about the unemployment and full employment situation. Accordingly; so long as there is unemployment, output and employment will change in the same proportion as the quantity of money, but there will be no

change in price [31]. Thus, this approach has the value of emphasizing that objective of full employment and price stability may be inherently irreconcilable.

The Phillips Hypothesis

[32] examined the relationship between the rate of unemployment and the rate of money wage changes based on data for United States between the periods 1861 and1957. He derived an empirical result that there was an inverse relationship between the rate of unemployment and rate of increase in money wage. According to his findings, when unemployment was high, wage increased slowly while wages rises rapidly when unemployment was low. Phillip's hypothesis gained support from [33] who was among the first researchers on the trade-off thesis. [34] examined the relationship between two macro economical variable in the contest of United States. The results led variable in the context there is an inverse relationship between unemployment and inflation rates in the U.S.A.

Furthermore, [35] [36] confirmed the existence of a negative trade-off relationship between unemployment and inflation using macro-economic data. These empirical findings have been as the 'Solow-Gordon affirmation' of the Phillips curve. However, the Phillips curve faced strong opposition from monetarists school, among them was the American economists Milton Friedman and Edmund Phelps. Friedman acceptance that the Phillips curve existed but only in the short run while in long run, the Phillips is vertical and there is no tradeoff between inflation and unemployment. He taught that both the demand for and supply of labour depended on the real wage rather than on the nominal wage. Since the nominal wage was evaluated in terms of the expected average consumer price level by employers and in terms of the expected average consumer's price level by workers, employment could increase only as long as price level tagged behind the actual price level. In equilibrium, the expected and actual price levels are equal and so in equilibrium only one level of unemployment and output is possible. Friedman dubbed the associated unemployment rate as 'the natural rate of unemployment'. The natural rate of unemployment is the rate at which the actual rate of inflation is equal to the expected rate of inflation. By this argument, the long run Phillips curve is vertical line at the natural rate of unemployment. [37], in contrast to Friedman, believed that the Phillips curve existed within limits. But as the economy expands and employment grows, the curve becomes even more fragile and vanishes until it becomes vertical at a critically low rate of unemployment. Thus, Tobin's Phillips curve is kinked shape a part have a Phillips have a normal Phillips and the rest vertical at all rate of inflation. According to him, the curve is vertical at positive rate of inflation and horizontal at negative rate of inflation.

Empirical Literature

In recent years, there has been much discussion regarding the applicability of Phillips curve in Nigeria and other countries. Here empirical review of other peoples work on the relationship between unemployment and inflation is done. [38] examined how unemployment and inflation substantially affect economic growth. To achieve this, three models were thoroughly subjected to quantitative analysis, namely; Ordinary Least Square (OLS) method, Augmented Dickey-Fuller (ADF) technique and Granger causality test. The result of the regression revealed that the coefficient of inflation is positive and statistically significant while unemployment is positive but has no significant effect on economic growth. This proves that inflation substantially affect economic growth, although unemployment has little substantial effect on it. Result of causality test suggests that unemployment does not granger causes economic growth and inflation, but economic growth and inflation Granger cause unemployment. The study recommended that concerted efforts should be made by policy makers towards restructuring the economy, managing price instability and improving infrastructure.

[39] provided analysis of the relationship between unemployment, inflation and economic growth in Nigeria between 1987 and 2012. The methodology of ordinary

least squares was adopted and the results confirms that in the long run, interest rate and total public expenditure have significant impact on economic growth in Nigeria, while inflation and unemployment has inverse effects on growth in Nigeria. However, the study found a causal linkage between inflation, unemployment and economic growth in Nigeria and recommended that the government must as a matter of necessity improve or continue to fine-tune macroeconomic policy instruments to achieve a sustainable and enable environment that will enhance increase in domestic output.

Inflation and unemployment nexus in Nigeria was investigated by [40]. The study adopted a distributed lag model with data covering the period 1970-2011. The consumer's price index (a measure of inflation rate), was regressed on unemployment rate, growth rate of money supply, budget deficit, real gross domestic product, interest rate and the lag of current interest rate. The result revealed that unemployment is a significant determinant of inflation and that there is a positive relationship between inflation and unemployment rate in Nigeria. Hence, the finding invalidates the original proposition on the Phillips curve hypothesis in Nigeria. The study therefore recommended that the economy should be diversified and appropriate policies should be put in place by Government and the monetary authorities in order to curb the menace of inflation and unemployment and consequently reduce the problem of stagflation in Nigeria.

[37] investigated the effect of unemployment and inflation on economic growth in Nigeria between 1986-2010 through the application of Augmented Dickey-Fuller technique in testing the unit root property of the series and Granger causality test of causation between GDP, unemployment and inflation. The results of unit root suggest that all the variables in the model were stationary and the results of Causality suggest that unemployment and inflation cause RGDP and not RGDP causing unemployment and inflation. The result shows a one-way causation running from unemployment and inflation to RGDP. The results revealed that unemployment and inflation possessed a positive impact on economic growth. The result also shows that unemployment does not significantly affect economic growth, but a good performance of an economy in terms of per capita growth may therefore be attributed to the rate of inflation in the country. A major policy implication of their result is that concerted effort should be made by policy makers to increase the level of output in Nigeria by improving productivity/supply in order to reduce unemployment and the prices of goods and services (inflation) so as to boost the growth of the economy.

[22] examined the existence and the stability of Phillips relations for Nigeria, using time series data from 1970 to 2010. Graphical, Augmented Dickey Fuller and Philip Peron unit root tests were employed to check for stationarity. ARDL and DOLS general to specific approaches to cointegration was used to explore the Philips relations and ECM to determine short run dynamics. The estimates shows that relation between the change in inflation rate and the unemployment rate is theoretically negative in the short run-a low unemployment rate leads to an increase in the inflation rate and therefore an acceleration of the price level however, the relation became nonexistent in the long run with positive relationship between inflation and unemployment signifying stagflation. Meanwhile, recursive residual, CUSUM and CUSUM sq tests confirm a stable Philips relation.

[27] studied the trade-off between unemployment and inflation in Nigeria, using a tradeoff model used by Rea (1983). His studies revealed that there is no tradeoff between inflation and unemployment. Rather the estimates established a non-linear curve that slopes upwards. Also, his findings showed that causality existed between inflation and unemployment, which implies that any attempt to control inflation results to the aggravation of unemployment and vice-versa. However, [8] tested the Phillips hypothesis by employing the hourly wage

earning. He concluded that during the inter-war period (1926-1966) in Britain, the Phillips curve was not supported by his data.

[14] analyzed the New Keynesian Phillips curve with forward looking expectations by using panel data. They found that unemployment rate have significant relationship with non-tradable inflation rates. By contrast, [23] used the dynamic panel data method and failed to identity a significant relationship between inflation and unemployment rates.

[40] investigated the relationship between unemployment and inflation in Nigeria and found that there is a negative with the coefficient of -0.412; this valid data causality test indicated no causality between unemployment and inflation in Nigeria. [25] applied the Vector Error correction model (VECM) analysis to test the existence of the Phillips curve in Malaysia from the period 1973-2004. The research showed that there existed the co-integrated relationship as well as causal relationship between unemployment and inflation in Malaysia.

[28] used the conventional Phillips curve to investigate forecasts of U.S. inflation at the 12-month horizon. The authors focused on three questions. They found that inflation forecasts produced by Phillips curve generally had been more accurate than forecasts based on other macroeconomic variables, including interest rates, money and commodity prices but relying on it to the exclusion of other forecasts was a mistake. Forecasting relations based on other measures of aggregate activity could perform as well or better than those based on unemployment, and combining these forecasts would produce optimal forecasts.

[23] conducted a study on the relationship among Chinese unemployment rate, economic growth and inflation. They employed Granger-causality test, unit root, co integration and VAR and VEC model. The study revealed that unemployment impact negatively on growth while inflation impacted positively on growth in China. The study also revealed no causation between unemployment and growth.

METHODOLOGY

Research Design

The design adopted for this study is the ex-post factor method also known as causal comparative research. This becomes necessary because the independent variables cannot be manipulated directly. The variables to be included in the study model is unemployment rate (UMPR) which is the dependent variable, inflation rate (INF), gross domestic product (GDP) and government expenditure (GEX) which are the explanatory variables, with a view to determining the nature and extent of the relationship that exist between the dependent variable and the set of explanatory variables, error correction mechanism was adopted while E-view 9.0 econometric package was used for the estimation.

Model Specification

In an attempt to explore empirically on the relationship between unemployment and inflation in Nigeria, a model will be employed. In the model, inflation (INF), Gross Domestic Product (GDP) and government expenditure (GEX) will be regressed on unemployment rate (UMPR) in order to ascertain the impact of the explanatory variables on the explained variable. From the foregoing analysis, the model can be written in its functional form as follows:

UMPR = f (INF, GEX, GDP)

(1)Expanding the model into a linear mathematical relationship, we have

$UMPR = b_o + b_1 INF + b_2 GEX + b_3 GDP$

(2)We complete the econometric model by including the stochastic term Ut. Thus our model becomes;

$UMPR = b_0 + b_1 INF + b_2 GEX + b_3 GDP + Ut$
        (3)

Where:

UMPR   =   Unemployment Rate.

INF   =   Inflation Rate.

GEX   =   Government Expenditure.

GDP   =   Gross Domestic Product

F   =   Functional relationship

b_0 =   intercept
b_1,   =   the coefficients or parameters attached to the explanatory variables.
Ut   =   stochastic variable

A priori expectation

The theoretical a priori expected signs of the macroeconomic variables in the model are stated as thus below

b_1 which is the coefficient of inflation is expected to be negative. This is because a reduction in inflation leads to an increase in unemployment.

b_2 is expected to be negative, because an increase in government expenditure will cause unemployment to reduce, through the establishment of job-creating industries.

b_3 which is the coefficient of the Gross Domestic Product, is expected to be negative. In that, an increase in a country's GDP will cause unemployment to reduce. This is true because when GDP increases, the economy has enough money to establish job-creating industries

In summary,

b_1, b_2 and b_3, < 0

Data

The data employed in this research are secondary obtained from the central bank of Nigeria's statistical bulletin and from the World Bank data bank. The data used in this study are mainly nominal and the period covered is from 1981-2018, a period of thirty five years (37years)

PRESENTATION OF EMPERICAL RESULTS
Summary Statistics

The summary statistics of the variables used in the study are presented in Table 1 as thus.

Table 1: *Summary Statistics of Time Series Variables Employed*

	UMPR	INF	LRGDP	TGEXP
Mean	11.23947	19.32421	10.26894	1698.669
Median	10.05000	12.55000	10.04588	647.5650
Maximum	27.40000	72.84000	11.15353	7357.300
Minimum	1.800000	5.380000	9.530920	9.640000
Std. Dev.	8.017937	17.25569	0.561194	2037.618
Skewness	0.640666	1.742352	0.344411	1.060639
Kurtosis	2.156959	4.837572	1.630051	3.010021
Jarque-Bera	3.724843	24.57306	3.722790	7.124872
Probability	0.155296	0.000005	0.155456	0.028370
Sum	427.1000	734.3200	390.2197	64549.41
Sum Sq. Dev.	2378.631	11017.08	11.65274	1.54E+08
Observations	38	38	38	38

Source: *Author's Estimates*

The above summary statistics presented in table 1, shows that the distributions of the variables used in the study are normally distributed except that of Inflation. The result also indicates that the real GDP has the lowest average scores while total government expenditure has the largest average value of all the series used in the study as presented in table one. The result also revealed that real GDP has a very low standard deviation followed by Unemployment Rate, Inflation and Total Government Expenditure. Furthermore, the skewness result shows that all the variables used in the study are positively skewed.

Unit Root Test Result

The Augmented Dickey Fuller (ADF) unit root test with trend and intercept is employed in order to test for the stationary of the time series data used in the study and they are presented in the table 2 as thus below.

Table 2: *ADF Unit Root Test of Stationary of Time Series Data*

Series	ADF Statistic	t-Statistic @ 5% level of Sig.	P-Values	Order of Integration	Remarks
UMPR	-3.752421	-3.568379	0.0339	I(1)	Stationary
LRGDP	-4.138011	-3.580623	0.0152	I(0)	Stationary
INF	-4.385587	-3.580623	0.0087	I(0)	Stationary
TGEXP	-5.812545	-3.562882	0.0002	I(1)	Stationary

NB: *I(0) stands for series integrated at level while I(1) stands for series integrated at first difference.*

Source: *Researcher's Compilation*

The above Augmented Dickey Fuller (ADF) unit root test presented in table 2 indicates that Unemployment Rate, and Total Government Expenditure are stationary at first difference while Real GDP and Inflation are stationary at level.

The unit root test result of the variables of the study further revealed that there exist a mixed order of integration among the variables used for the study and also that none of the variable is integrated at second differencing or order two.

ARDL Bounds Test

Table 3: *ARDL Bounds test result*

Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	k
F-statistic	5.690762	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.72	3.77
5%	3.23	4.35
2.50%	3.69	4.89
1%	4.29	5.61

Source: *Researcher's Estimate*

The ARDL Bound test result presented in table 3 above indicates that there is a presence of long run relationship at 5% level of significant existing between unemployment and inflation in Nigeria under the periods of the study. On the other hand, it means that the unemployment and Inflation are cointegrated at the long run in the country.

ARDL Short Run and Long Run Form
Table 4: *ARDL Short Run and Long Run Form*

	Cointegrating Form			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(UMPR(-1))	0.765195	0.230940	3.313397	0.0035
D(UMPR(-2))	0.358308	0.128639	2.785381	0.0114
D(UMPR(-3))	0.929817	0.428033	2.172304	0.0420
D(INF)	-0.055009	0.025562	-2.151984	0.0438
D(INF)	0.080651	0.036203	2.227728	0.0375
D(INF)	0.014181	0.040359	0.351373	0.7290
D(INF)	0.057638	0.035274	1.634017	0.1179
D(LRGDP)	6.981273	2.915780	2.394308	0.0266
D(TGEXP)	-0.000407	0.002316	-0.175614	0.8624
D(TGEXP(-1))	-0.006714	0.003896	-1.723220	0.1003
CointEq(-1)	-1.448098	0.408303	-3.546626	0.0020

Cointeq = UMPR - (-0.1484*INF + 4.8210*LRGDP + 0.0023*TGEXP -38.7836)

	Long Run Coefficients			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.148373	0.016925	-8.766545	0.0000
LRGDP	4.820994	1.160550	4.154060	0.0005
TGEXP	0.002268	0.000390	5.812519	0.0000
C	-38.783562	11.458392	-3.384730	0.0029

Source: *Researcher's Estimate*

The Error Correction Mechanism (ECM), the short and the long run form of the results presented in table 4 above, shows that the coefficient of the error correction term is negative and also statistically significantly different from zero. This implies that in the event of deviation between actual and long-run equilibrium level, there would be an adjustment back to the long-run relationship in subsequent periods in order to eliminate this discrepancy; the error correction mechanism is used to get the model back to the long run equilibrium. The result of the error correction transmission indicates that it will take the value of -1.45 percent for the model to adjust back to the long run equilibrium after a shock in the short run.

The short run coefficients of the variables used in the study indicates that the past values of unemployment are significantly responsible for the present values of unemployment rate in the country, i.e. the accumulated past values of unemployment contributes to the increase of the present day unemployment in the country. This result implies that all the efforts of the government in attempt to reduce the unemployment level in the country do not actually contribute to the reduction of unemployment in the country at the short run. While the coefficient of inflation shows that inflation statistically significant to influence the outcomes of unemployment negatively and as well as positively; negatively in the sense that during increase in inflation workers (especially government workers) are discouraged from working as a result of fixed and stagnant salaries paid by their employers which has no values when compared to the rising prices of goods and services in the market, on the other side, since little increase in inflation increase investment and also economic growth, there will be an increase in employment which thereby leads to decrease in unemployment in the country. On the other hand, the long run coefficients of the variables used in the .

study revealed that Inflation is statistically significant to influence negative changes that occur in Unemployment in the country, in the same way that GDP and total government expenditure respectively are statistically significant to influence changes that occurs in unemployment rates in the country under the periods of the study. The long run result also shows that one percent increase in inflation will cause unemployment to decrease by 0.15 percent while an increase in total government expenditure and economic growth leads unemployment to increase by 0.22 and 4.82 percents respectively. Due the signs of total government expenditure and economic growth is expected to be negative, but in the context of Nigeria's economy has prove abortive due to some factors such as high rate of corruption, mismanagement of resources, yearly increase in Nigeria's economic growth without development and so many other factors are responsible for increase in unemployment in Nigeria despite the increase in total government expenditure and economic growth in the country.

Post-diagnostic Tests

The post diagnostic tests of the result are presented as thus below.

Serial correlation post diagnostic test
Table 5: *Breusch-Godfrey Serial Correlation LM Test*

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.801386	Prob. F(1,19)	0.3819
Obs*R-squared	1.376021	Prob. Chi-Square(1)	0.2408

Source: *Researcher's Estimate*

The post diagnostic result of serial correlation in table 5 above revealed that there is no presence of serial correlation, because both the probability values of F-statistic and observed R-square are higher than 5 percent level of significant.

Heteroskedasticity Post Diagnostic Test
Table 6: *Heteroskedasticity Test: Breusch-Pagan-Godfrey*

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	1.775746	Prob. F(13,20)	0.1203
Obs*R-squared	18.21714	Prob. Chi-Square(13)	0.1494
Scaled explained SS	7.530386	Prob. Chi-Square(13)	0.8728

Source: *Researcher's Estimate*

The Breusch-Pagan-Godfrey test of Heteroskedasticity in table 5 above also revealed that there is no presence of Heteroskedasticity, because the probabilities of F statistic and that of the observed R square are higher than 5 percent level of significant.

Histogram Normality Post Diagnostic Test
The histogram normality test presented in figure 1 below shows that the residual of the model is normally distributed, because the probability of the kurtosis is greater than 5 percent level of significant.

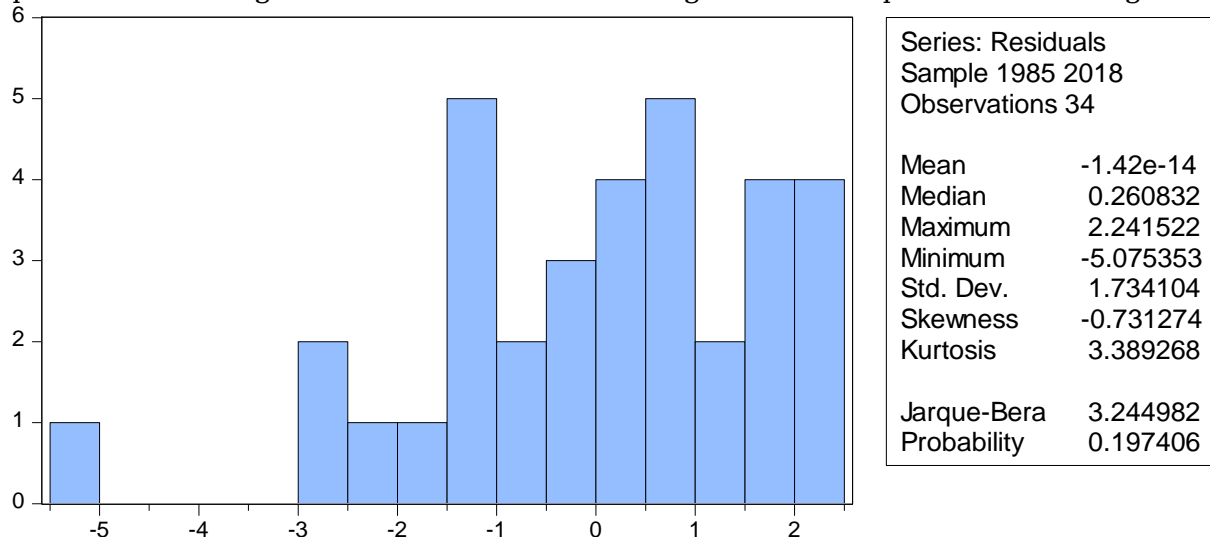| Series: Residuals	
Sample 1985 2018	
Observations 34	
Mean	-1.42e-14
Median	0.260832
Maximum	2.241522
Minimum	-5.075353
Std. Dev.	1.734104
Skewness	-0.731274
Kurtosis	3.389268
Jarque-Bera	3.244982
Probability	0.197406

Figure 1: Post Diagnostic Normality test

Test of Research Hypotheses
Test of hypothesis is the used of statistics to determine the probability that a given claim or proposition is true or not. Thus in hypothesis testing, the t-statistics and its probability values are used to test for the significance of the variables used in the study as stated in null hypotheses.
The hypotheses of the study and their decision rules are restated as thus below:
Test of Hypothesis One
The null hypothesis one is restated as thus; there is no significant trade-off relationship between inflation and unemployment in Nigeria.

Decision Rule for hypothesis one is stated that if the probability value of the test – statistic of the coefficient of inflation rate is negative and also less than 5% level of the critical value, then the null hypothesis is rejected and study concludes that there is s statistically significant trade-off relationship existing between inflation and unemployment in Nigeria.
Having a look at the empirical result in table 4 above, it indicates that the coefficient of the inflation rate is -0.148373 with the test statistic of -8.766545 and the probability value of 0.0000. Therefore, since the coefficient of the inflation rate is negative and its

probability value of the test statistic is less than 5% level of significant, then the study conclude that there is a statistical significant trade-off relationship existing between inflation rate and unemployment rate in Nigeria under the periods of the study.

Test of Hypothesis Two
The null hypothesis two is restated as there is no significant impact of economic growth on unemployment in Nigeria.

Decision Rule for hypothesis two is stated that if the probability value of the test – statistic of the coefficient of economic growth is less than 5% level of the critical value, then the null hypothesis is rejected and study concludes that economic growth is statistically significant and has an impact on unemployment rate in Nigeria under the periods of the study.

Having a look at the empirical result in table 4 above, it indicates that the coefficient of the economic growth 4.820994 with the test statistic of 4.154060 and the probability value of 0.0005.

Therefore, since the probability value of the test statistic of economic growth is less than 5% level of significant, the study conclude that economic growth is statistically significant and has a positive

impact on the unemployment rate in Nigeria under the periods of the study.

Test of Hypothesis Three
The null hypothesis three is restated as there is no significant effect of total government expenditure on unemployment rate in Nigeria.

Decision Rule for hypothesis three is stated that if the probability value of the test – statistic of the coefficient of total government expenditure is less than 5% level of the critical value, then the null hypothesis is rejected and concludes that total government expenditure is statistically significant and has an effect on unemployment rate in Nigeria under the periods of the study.

Having a look at the empirical result in table 4 above, it indicates that the coefficient of the total government expenditure is 0.002268 with the test statistic of 5.812519 and the probability value of 0.0000.

Therefore, since the probability value of the test statistic of total government expenditure is less than 5% level of significant, the study conclude that total government expenditure is statistically significant and has a positive effect on unemployment rate in Nigeria under the periods of the study.

SUMMERY OF FINDINGS
The test for unit root test results presented in table 2 above shown that unemployment rate and total government expenditure respectively were stationary at first difference whereas economic growth and inflation rate were stationary at level.

The ARDL – Bound test conducted revealed that there was a long run relationship existing between inflation rate and unemployment rate in Nigeria.

The results of the long run coefficients of the variables used in the study revealed that inflation rate was statistically significance and impacted negatively on unemployment rate in Nigeria; whereas gross domestic product and total government expenditure respectively were statistically significance and also impacted positively on unemployment rate in Nigeria.

The post-diagnostic result conducted on the above regression result indicated that

the regression model employed for the study is free from autocorrelation, heteroskedasticity and the residuals of the model are normally distributed.

The Relationship Existing between Inflation and Unemployment Rate in Nigeria
The inflation rate result presented in table 4 above indicated that inflation has a negative and significant relationship or impact on unemployment rate in Nigeria at the long run. The result also disclosed that increase in inflation rate by one percent, unemployment rate will reduce by 14.8% and vice versa in Nigeria. It means that there is an inverse relationship existing between inflation and unemployment in Nigeria under the periods of the study; thereby complying with the trade-off relationship existing between inflation and unemployment rate according to Phillip's curve accretion of the relationship existing between inflation

rate and unemployment rate in an economy.

The Effect of Economic Growth on Unemployment Rate in Nigeria

The importance of economic growth in the country cannot be overemphasis in terms of improving the economic variables in the economy, but will that be true in Nigeria's economy? The result of economic growth presented in table 4 above indicated that economic growth has a negative and significant effect on unemployment rate in Nigeria at the long run. That is to say indeed that economic growth is a significant factor that determines the performance of other economic variables in the country, though impacted negatively on unemployment rate in Nigeria but that is the true picture of the relationship existing between economic growth and unemployment rate in the country. The result also disclosed that increase in economic growth by one percent, causes unemployment rate to increase by 4.8% in Nigeria.

The Impact of Total Government Expenditure on Unemployment Rate in Nigeria

The total government expenditure result presented in table 4 above indicated that total government expenditure has a positive and significant effect on unemployment rate in Nigeria at the long run. The result also disclosed that increase in total government expenditure by one percent causes unemployment rate to increase by 0.02% in Nigeria. It means that though total government expenditure is a significant factor in determining the performance of unemployment rate in Nigeria, but it has not be effectively utilized in term of Nigeria's total expenditure may as a result of corruption and mismanagement of fund in the country.

The study investigated the existence of Phillips curve in Nigeria for the period between 1981 and 2018 employing various techniques of econometric analysis. Having estimated and analyzed the nature of the link existing between inflation and unemployment rate in Nigeria in the previous chapter using ARDL model, the summary of the findings are as stated below:

Firstly, that result of the unit root test conducted using Augmented Dickey-Fuller (ADF) test shown that the variables are stationary both at level and at first differencing; hence indicating that the variables have mixed order of integration and none of the variable is integrated of order two.

Secondly, that the Bounds tests of the Auto regressive distributed lag (ARDL) result shown that the variables are cointegrated at the long run. Hence, there is presence of long-run equilibrium relationship existing between unemployment rate and inflation rate in Nigeria.

Thirdly, that the coefficients of the long run estimate indicated that inflation rate is statistically significant and negatively related to unemployment rate. The result further shows that a percent increase in inflation rate bring about a 0.15 percent decrease in unemployment in Nigeria.

Finally, that the coefficient of total government expenditure and economic growth respectively are statistically significant but contributed positively to the increase in unemployment rate in Nigeria.

Policy Recommendations

In the light of the research findings, the following recommendations were made.

Firstly, since the empirical results of this study revealed a negative long run relationship between inflation and unemployment in Nigeria thereby validating the Phillips curve thesis in the country, the researcher thereby recommend that the government should put-up policies in order to reduce unemployment rate in the country, and caution should be applied by the policy makers to ensure that such policies do not trigger very high rate of inflation in the country. In other words policy makers should choose the best combinations of unemployment rate and inflation rates that will aid the Nigerian's economy to operate efficiently and at its optimum.

Secondly, that the government should effectively make the best use of her expenditure and also diversify her economy for optimum production and employment generation in order to reduce

the rate of unemployment rate in the country.

CONCLUSION

This study examined the existence of Phillips curve in Nigeria using data between 1981 and 2018. Unemployment rate (UNMP) was used as the dependent variable while Inflation rates (INF), Gross domestic product (GDP) and Total government expenditure (TGEX) were the independent variables. The unit root test of the variables used in the study using Augmented Dickey-Fuller (ADF) technique indicated that the variables are stationary at level and at first difference. Following the different orders of integration observed from the unit root test, an Autoregressive Distributed Lag Approach was employed in order to analyze the long-run relationships and short run dynamic interactions among the variables used in the study. Findings from the ARDL/Bound test shows evidence of long run relationship while the long run coefficients of the variables used in the study indicated that inflation was statistically significant and also negatively relationship to unemployment in the country. Based on these findings above, the researcher thereby recommend that the policy makers should choose the best combinations of unemployment rate and inflation rate that best suit the economy for optima production and also the government should diversify her economy in order to increase her production and also create employment opportunities in the country in order to reduced the unemployment rate in the country.

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