Investigating the Relationship between Unemployment and Inflation in Nigeria

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ABSTRACT: This study considered the impact of inflation on unemployment in Nigeria viz avis selected macroeconomic variables. The researcher adopted co integration, vector error correction model and VEC Granger causality test econometric procedure in the analysis of the data employed. The specific objectives of the study are; (i) to determine the extent to which inflation impact on unemployment in Nigeria within the period of study, (ii) to examine if government expenditure have any significant impact on unemployment in Nigeria within the period of study, (iii) to estimate the significant impact of foreign direct investment on unemployment in Nigeria within the period of study; (iv) to investigate the extent of direction of causality between unemployment and inflation in Nigeria within the period of study. The results of the research revealed long run relationship among estimated variables, VECM result showed a positive significant relationship between inflation and unemployment in the short run and long run, government expenditure and foreign direct investment maintained negative relationship with unemployment both in the short and long run. The VEC Granger causality test indicated causality among UNEM, INF and TGEX. The research recommended that (i) government should focus on policy and strategy that can attract foreign direct investment into the country, (ii) government should try to maintain low inflation rate through suitable monetary policy; (iii) government should encourage investment platforms and enabling environment for effective and efficient national output; and (iv) Government should consciously increase fiscal space for capital activities and projects that are capable of generating income, increase domestic and public spending, improve economic status and reduce unemployment. This paper concluded that the Philip's curve hypothesis does not apply in Nigeria within the period of study as the result failed to establish an inverse relationship as postulated by A.W. Philips.

KEYWORDS: Inflation, Unemployment, Philip's curve, Economic Growth, Significance

BACKGROUND

Inflation is the consistent increase in the price of goods and services in an economy. While Unemployment on the other hand is the number of economically active population without work but are willing and seeking for work. These include those who have lost their jobs. Inflation and Unemployment are twin economic problems. It is the desire of every economic manager to have a low rate of inflation and unemployment. A single-digit rate of inflation and 5% rate of unemployment are generally tolerable and may not create macroeconomic instability in an economy all things being equal. Implying that a falling unemployment rate generally occurs alongside rising gross domestic product (GDP), higher wages, and higher industrial production. However, the relationship between unemployment and inflation can be explained in several perspective. Philips (1958) explained it in terms of tradeoff, while Keynes (1936) asserted that an increase in unemployment reduces income, which reduces consumption, and reduces aggregate output. As a result, employment is increased by increasing consumption or investment

Inflation in Nigeria, caused various government policies to stimulate fast rate of economic growth and development. The problem of inflation in Nigeria was brought about by the oil glut in 1981, which resulted into balance of payment deficits leading to foreign exchange crisis that necessitated various measures of import restrictions. These restrictions reduced raw materials for domestic production and spare parts for machinery operation. The resultant shortage of goods and services for local consumption spurred the inflation rate to rise from 9.9% in 1980 to 39.9% in 1984, 40.9% in 1989, 72% in 1995, and reduced to 18.9% in 2001, 8.2% in 2006. It rose again to 13% in 2010, 18.6% in 2016, then, reduced to 15.4% in 2017 and 11.4 in 2018, (CBN, 2009, 2012, 2015 and 2017).

Unemployment on the other hand is the number of economically active population without work but are willing and seeking for work. These include those who have lost their jobs and have voluntarily left work (World Bank, 1999). Unemployment has been categorized as one of the serious impediments to social progress. Apart from representing an enormous waste of a country's manpower resources, it generates welfare loss in terms of lower output thereby leading to lower income and well-being (Raheem, 1993). According to Ugwuanyi in the work of Nazifi and Aliyu (2017), macroeconomic performance is judged by three broad measures- unemployment rate, inflation rate, and the growth rate of output. The unemployment rate is a vital measure of economic performance. A falling unemployment rate generally occurs alongside rising gross domestic

In general, when unemployment rate drops below a certain level, referred to as the natural rate, the inflation rate will tend to increase and continue to rise until the unemployment rate returns to its natural rate. Alternatively, when the unemployment rate rises above the natural rate, the inflation rate will tend to decelerate.

PROBLEM STATEMENT

The negative impact of inflation and unemployment cannot be over emphasized. Unemployment breeds insecurity, poverty, illness and other social vices, mostly seen in the developing economies, Nigeria inclusive. Inflation on the other hand affects the value of our currency, export and overall productivity. The Nigerian economy has been bedeviled by the twin economic problems, which has defiled various economic prescriptions, like NEEDS, Vision 2020, 7-point Agenda etc.

Nigeria remains a leading oil importing country, despite being a major producer of oil, denying our youths the opportunities inherent in the sector and with all its associated effects on exchange rates, hence inflation. This is explained by economic theory that claims that with economic growth, inflation exist which in turn should lead to more jobs and less unemployment. Again, as inflation accelerates, workers may supply labor in short term because of higher wages, this leads to decline in the unemployment rate. This implies that over the long term, higher inflation would not benefit the economy through a lower rate of unemployment.

Efforts at stemming inflationary trends in Nigeria over the years have culminated in adoption of a combination of several measures, ranging from wage freezes, price controls, direct involvement of government in the procurement and distribution of essential commodities, to fiscal strategies and recently monetary strategies including currency devaluation (Migap, 2011).

Despite the fact that Nigeria is an oil producing nation with attendant high volume of foreign exchange, yet, this has failed to translate into job opportunities and stable prices (1980-2018). Unemployment has consistently gone above acceptable benchmark of 5%, as in the table. While inflation remain in its double digit throughout the study period. This study statistically investigated relationship between inflation and unemployment in Nigeria within the study period.

OBJECTIVE OF THE STUDY

The broad objective is to examine the validity of Philips hypothesis in Nigeria. The specific objectives are;

1. to determine the extent to which inflation impact on unemployment in Nigeria within the period of study.
2. to examine if government expenditure have any significant impact on unemployment in Nigeria within the period of study.
3. to estimate the significant impact of foreign direct investment on unemployment in Nigeria within the period of study.
4. to investigate the extent of direction of causality between unemployment and inflation in Nigeria within the period of study

These objectives were considered in developing the research questions and hypotheses.

LITERATURE REVIEW

The literatures were reviewed in terms of concepts, theories and empirical researches.

Concept of Unemployment:

Unemployment is defined in economic terms as a situation where someone that is willing and able to work but cannot find job or work, even at appropriate wage rate. The natural rate of unemployment is not immutable and fluctuates alongside changes within the economy. It is therefore expected that changes within the economy can change the natural unemployment rate, (O'Nwachukwu, 2017). For example, the natural rate of unemployment is affected by changes in the demographics, educational attainment, and work experience of the labor force; institutions like apprenticeship programs and public policies; changes in productivity growth; and contemporaneous and previous level of long-term unemployment.

In terms of supply and wages for labour, if the rate of change in wages is used as a proxy for inflation in the economy when unemployment is high, the number of people looking for work significantly exceeds the number of jobs available. In other words, the supply of labor will be greater than the demand for it. This means that with so many workers available, there is little need for employers to "bid" for the services of employees by paying them higher wages. In times of high unemployment, wages typically remain stagnant, and wage inflation (or rising wages) is non-existent. Then in times of low unemployment, the demand for labor (by employers) exceeds the supply. In such a tight labor market, employers typically need to pay higher wages to attract employees, ultimately leading to rising wage inflation.

Four main features of the economy affect the natural unemployment rate:

1. Labor market composition,
2. Labor market institutions and public policy,
3. Productivity growth, and
4. Long-term that is, longer than 26 weeks unemployment rates.

Consequently, if young workers form a significant portion of the labor force, the natural rate of unemployment will be higher. Alternatively, individuals with higher levels of educational attainment generally find it easier to find work; therefore, as the average level of educational attainment of workers rises, the natural rate of unemployment will tend to decrease. More so, long-term unemployment in an economy can shift the natural rate of unemployment. Individuals who are unemployed for longer periods of time tend to forget certain skills and become less productive, and are therefore less attractive to employers.

Frictional unemployment is short-term unemployment that arises from the process of matching workers with jobs. Seasonal unemployment refers to unemployment due to factors such as weather, variations in tourism, and other calendar-related events. Because seasonal unemployment can make the unemployment rate seem artificially high during some months and artificially low during other months, one that is seasonally adjusted and one that is not. And structural unemployment arises from a persistent mismatch between the skills and attributes of workers and the requirements of jobs. Cyclical Unemployment caused by a business cycle recession is when the economy moves into recession, as production falls, they start laying off workers. Full employment is when the only remaining unemployment is structural and frictional. The fluctuations around this normal rate are mainly due to the changes in the level of cyclical unemployment.

Concept of Inflation:

Inflation is a sustained unaccepted rise in general price levels. There are several causes for prices to rise. When production costs, such as wages and raw material prices increase- cost-push inflation occurs. Inflation due to a rise in aggregate demand, or over demand compared to supply in the long run, is known as demand-pull inflation. This could also be caused by economic growth leading to inflationary expectations and lowers cyclical unemployment in the long run. In the short run, there is an over demand for labour, causing wage rates to rise. This is an incentive for people to find employment since the opportunity cost of leisure increases. Cost-push inflation occurs as wages are a large contributor to production costs. However, when unemployment increases like 2016 recession, a higher percentage of the population has less disposable income. Therefore, firms tend to have fewer sales and the government generates less tax revenue. This can be linked to lower consumer spending and investment.

In the long run, this will lower demand and thereby lower demand-pull inflation. This creates deflationary pressure as decreases in inflation causes higher inflation while rises in unemployment cause lower inflation.

The rate of inflation is not determined exclusively by the unemployment gap. Two prominent factors that also impact the rate of inflation are (1) expected inflation and (2) supply shocks. Individuals and businesses form expectations about the expected rate of inflation in the future, and make economic choices based on these expectations, (Ademola, Badiru, and Abdullahi (2016). For example, if individuals expect 2% inflation over the next year, they will seek a 2% increase in their nominal salary to preserve their real purchasing power. Firms will also incorporate inflation expectations when setting prices to keep the real price of their goods constant. An increase in the expected rate of inflation will be translated into an actual increase in the rate of inflation as wages and prices are set by individuals within the economy.

The study has reviewed some theories considered relevant to the research which include; Okun's Law of unemployment, structural theory of inflation and Philip's curve hypothesis (1958). The research is anchored on Philip's curve hypothesis based on its relevance to the study.

Theory of Inflation

There are three main theories of inflation, which are shown in figure 1 below:

Figure 1: Theories of Inflation
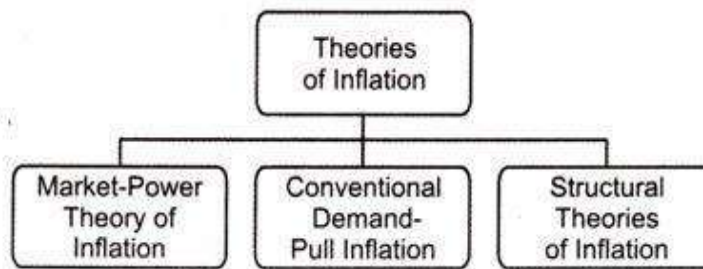
Source: Economics Discussion

For the purpose of this study, structural theory is reviewed.

Structural Theories of Inflation:

Structuralists believed that inflation occurs because of the unbalanced economic system and they used both monetary and fiscal measures together for sorting out economic problems. According to structural theory of inflation, market power is one of the factors that cause inflation, but it is not the only factor. The supporters of structural theories believed that the inflation arises due to structural maladjustments in the county or some of the institutional features of business environment. They have provided two types of theories to explain the causes of inflation, which are shown below:

Figure 2: Structural Theories of Inflation
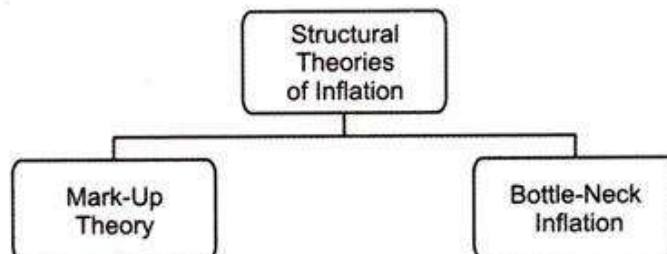
Source: Economics Discussion

Mark-up Theory:

Mark-up theory of inflation was proposed by Prof Gardner Ackley (1961). According to him, inflation cannot occur alone by demand and cost factors, but it is the cumulative effect of demand-pull and cost-push activities. Demand-pull inflation refers to the inflation that occurs due to excess of aggregate demand, which further results in the increases in price level. The increase in prices levels stimulates production, but increases demand for factors of production. Consequently, the cost and price both increases. So, according to Prof Gardner, inflation occurs due to excess of demand or increases in wage rates; therefore, both monetary and fiscal policies should be used to control inflation. Though, these two policies are not adequate to control inflation.

Bottle-Neck Inflation:

Bottle-neck inflation was introduced by Prof Otto Eckstein reviewed in the work of Alan S. Blinder (1982). According to him, the direct relationship between wages and prices of products is the main cause of inflation. He maintained that inflation occurs due to the boom in capital goods and wage-price spiral. He stated that during inflation prices in every industry is higher, but few industries show a very high price hike than rest of the industries. These industries are termed as bottle-neck industries, which are responsible for increase in prices of goods and services.

Okun's Law of Unemployment

An advocate of Keynesian economic policies, Okun was a firm believer in using fiscal policy to control inflation and stimulate employment. His studies of long-term unemployment rates led to the publication in 1962 of what became known as Okun's Law.

In economics, Okun's law (named after Arthur Melvin Okun, 1962) proposed the relationship in between unemployment and losses in a country's production. The "gap version" states that for every 1% increase in the unemployment rate, a country's GDP will be roughly an additional 2% lower than its potential GDP. The "difference version" describes the relationship between quarterly changes in unemployment and quarterly changes in real GDP. The stability and usefulness of the law has been disputed. Okun's law may more accurately be called "Okun's rule of thumb" because it is an approximation based on empirical observation rather than a result derived from theory. In his original statement, 2% increase in output corresponds to a 1% decline in the rate of cyclical unemployment; a 0.5% increase in labor force participation; a 0.5% increase in hours worked per employee; and a 1% increase in output per hours worked (labor productivity).

Holding other factors other than unemployment constant reduces the association between unemployment and GDP to around 0.7% for every 1% change in the unemployment rate (Prachowny 1993).

Philip's Curve Hypothesis

The Phillips curve represents the relationship between the rate of inflation and unemployment. A. W. H. Phillips's study of wage inflation and unemployment in the United Kingdom from 1861 to 1957 is a milestone in the development of macroeconomics. Phillips (1958) found a consistent inverse relationship between unemployment and inflation, in that when unemployment is high, wages increased slowly; when unemployment is low, wages rise rapidly. Phillips inferred that the lower the unemployment rate, the tighter the labor market and, therefore, the faster firms must raise wages to attract scarce labor. At higher rates of unemployment, the pressure declined. Phillip's curve represented the average relationship between unemployment and wage behavior over the business cycle. It showed the rate of wage inflation that would result if a particular level of unemployment persisted for some time. Philips argued that there was a stable negative relationship between the level of unemployment and the rate of change of wages. High level of unemployment being accompanied by falling wages, while low levels of unemployment by rising wages. The wage change in turn was linked to price change by allowing for the secular increase in productivity and treating the excess of price over wage cost as given by a roughly constant mark-up factor.

He also argued that when the economy moves up to the short run aggregate supply (SRAS) curve toward a higher price level and a higher output this reduces unemployment. Nevertheless, since there is a higher price level, this increases inflation. Thus, in order to get lower unemployment rates, a rise in inflation must be sacrificed. The Phillips Curve is made up of an equation with several parts such as presented below;
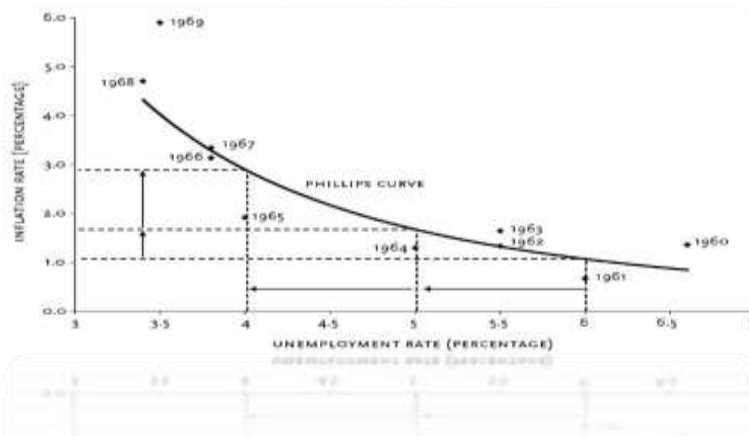
$$\pi = \pi_e - \beta(u - u^n) + \nu \qquad\qquad 1$$

In other to establish the influence of inflation on unemployment, the equation was transposed thus;

$$(u - u^n) = \pi_e - \pi + \nu \qquad\qquad 2$$

Where: π = Inflation, π_e = Expected Inflation, β is a parameter that measures the response of inflation with relation to cyclical unemployment, $(u - u^n)$ = Cyclical Unemployment and ν = Supply Shocks.

**Figure 3:** The Phillips Curve, 1961–1969

Source: Bureau of Labor Statistics.

Friedman (1977) took the position that there is no tradeoff between inflation and unemployment in the long run representing a monetarist view of Phillips curve. He argued that any attempt to hold the unemployment rate at an artificially low level would cause inflation to accelerate indefinitely. Friedman's and Phelps's analyses provided a distinction between the "short-run" and "long-run" Phillips curves. So long as the average rate of inflation remains fairly constant, as it did in the 1960s, inflation and unemployment will be inversely related (Short run). But if the average rate of inflation changes, as it will when policymakers persistently try to push unemployment below the natural rate, after a period of adjustment, unemployment will return to the natural rate (Long run). That is, once workers' expectations of price inflation have had time to adjust, the natural rate of unemployment is compatible with any rate of inflation.

Therefore, a given level of inflation will eventually be incorporated into the decision-making process and not affect the level of unemployment in the longrun. The long-run Phillips curve is vertical, since moving from one constant rate of inflation to another does not affect unemployment in the longrun. In the longrun, unemployment returns to the natural rate regardless of what constant rate of inflation is present in the economy.

Figure 4: Long run Philips Curve
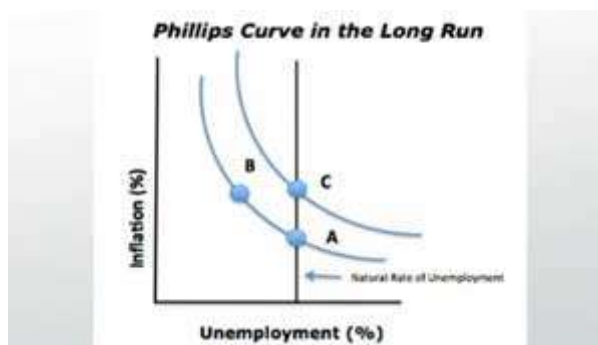
Source: 2020 Study.com

Empirical Review

Though, researches have been conducted to empirically investigate the nature of the relationship between inflation and unemployment, yet, previous studies have not reached a consensus on their relationship owing to their differences in scope, the specification of econometric models, and the selection of variables. The major gap found among the reviewed papers is the fact that 80 percent of them examined impact of inflation, unemployment on economic growth of economies; instead of search for direct impact of inflation on unemployment.

However, Richardson, Ugbor, Chisom and Ebikabowei (2018) conducted an analysis on the impact of inflation reduction on output and unemployment in Nigeria using the Instrumental Variables Generalized Method of Moments (IV-GMM) technique with data from1970-2015. The paper fell to use the appropriate estimation method, meaning that it supposed to use ARDL since the data has I(0) and I(1) order of integration. Also, the use of IV-GMM is inappropriate as it measures the causal relationship between variables, while the researchers sought to estimate the impact of the interested variables, one on the other. This research delves the link between the concerned variables using VECM technique spanning from 1980 – 2018, indicating a timeframe and methodological gap. The advantage of using VECM is that it has the capacity to test for short and long run influences of independent variables on dependent variables. Suffice it to say that it is the best and acceptable method for variables that are co integrated of the same order.

The research of Odo, Elom- Obed, Okoro and Nwachukwu (2017) has similar approach to this study in terms of some variables for estimation, geography and method used. But differ in period of study and inclusion of some macroeconomic variables like foreign direct investment etc. The authors used variables that has the tendency of autocorrelation (Inflation and Money supply) at the same side of the model, ie, as independent variables. Moses, Oduh, Charles and Obiageri (2018) assessed the severity of unemployment in Nigeria: Evidence from Fractional Integration. The paper did not investigate the link existing between unemployment and inflation which this paper considered.

Ajie, Ani and Ameh (2017) undertook an examination on the impact of unemployment and inflation on the Nigerian economy. The researchers concentrated on the impact of the two inversed variables (inflation and Unemployment) on the whole economy, not specifically one on the other which this paper estimated. The period of study is also updated to 2018 by this research. The order of integration of variables which should inform the statistical method employed was not specified.

This study will differ from the work of Saad and Salim (2017) in terms of time and method used. While Saad and Salim spanned from 1977 to 2011, this paper studied from 1980 to 2018. They used ARDL method and this paper used VECM to establish the relationship between inflation and unemployment in Nigeria. Anthony, Onyinye and Joan (2015) revealed the influence of inflation on unemployment in Nigeria; though differ from this study in terms of scope and choice of variable. While the study allowed variables that could lead to autocorrelation as independent variables in the model, like inflation, money supply and interest rate at the same side. This paper excluded all variables that have direct effect on each other as control variable.

Given an umbrella reaction to some of the reviewed papers, the gaps established below are found in the geographical, timeframe, variables and methodological context with regards to the researchers of Lucy, Ali and Samuel (2017), inflation and unemployment on the economic growth of Iraq using Vector Autoregressive (VAR) Model Approach. Hemish (2017) compared the relationship between inflation and unemployment in South Africa from1994-2015. Gylych, Olanrewaju and Abdurahman (2016) examined the impact of inflation and unemployment on economic growth in ten (10) selected member's States of Economic Community of West Africa States (ECOWAS) from 2001-2014. The researchers applied OLS for estimation which this study frowns at; reason being that a study of 10 different States should apply panel data analysis instead of OLS.

Another work by Mehrnoosh and Feizolah (2016) established the role of inflation and unemployment on economic growth of Iran from 1996 to 2012 using ARDL estimated with Eview 6.0. This updated study with emphasis on inflation, unemployment and money supply in Nigeria using Eview 9.0. Badreldin, Adam and Adil (2016) investigated from an empirical point of view, the relationship between unemployment and inflation in Sudan during the period 1992-2015. Geographical and time period gap is also established here and causality was there interest, while significant or no impact is estimated in this study. However, without repetition of the reviewed papers, we ascertained that gaps which informed this research work existed in terms of time period, geography, variables, statistical methods and sources of data.

RESEARCH DESIGN

Every research design is structured so as to address the central research questions and hypotheses (Trochim, 2008). In this research which seeks to assess the impact of inflation on unemployment in Nigerian for the period of 1980 to 2018. Ex-post facto research design approach is adopted in this study with the justification that ex-post facto design allows the privilege of observing one or more variables over a period of time and that the data employed already existed and cannot be manipulated.

MODEL SPECIFICATION

The theoretical framework for this research is the Phillips Curve hypothesis which stated that the relationship between inflation and unemployment in the short-run is a consistent inverse one. A.W. Philips argued that when the economy moves up to the short run aggregate supply (SRAS) curve toward a higher price level and a higher output this reduces unemployment. Nevertheless, since there is a higher price level, this increases inflation. Thus, in order to get lower unemployment rates, a rise in inflation must be sacrificed. The Phillips Curve is made up of an equation with several parts such as presented below;

$$\pi = \pi_e - \beta(u - u^n) + \nu$$

In other to establish the influence of inflation on unemployment, equation is transposed thus;

$$(u - u^n) = \pi_e - \pi + \nu$$

Where: π = Inflation, π_e = Expected Inflation, β is a parameter that measures the response of inflation with relation to cyclical unemployment, $(u - u^n)$ = Cyclical Unemployment and ν = Supply Shocks.

The Phillips curve equation can be derived from the (short-run) Lucas aggregate supply function. The Lucas approach is very different from that of the traditional view. Instead of starting with empirical data, he started with a classical economic model following very simple economic principles.

Start with the aggregate supply function:

$$Y = Y_n + \alpha (P - P_e)$$

where Y is log value of the actual output, Y_n is log value of the "natural" level of output, a is a positive constant, P is log value of the actual price level, and P_e is log value of the expected price level. Lucas assumes that Y_n has a unique value. We re-arrange the equation into:

$$P = \frac{Y - Y_n}{P_e + \alpha}$$

Next we add unexpected exogenous shocks to the world supply v:

$$P = \frac{Y - Y_n}{P_e + \alpha + v}$$

Subtracting last year's price levels P_{-1} will give us inflation rates, because

$$P = P_e - 1 \approx \pi$$

and

$$P_e - P - 1 \approx \pi$$

where π and π_e are the inflation and expected inflation respectively.

There is also a negative relationship between output and unemployment (as expressed by Okun's law). Therefore, using

$$\alpha = \frac{Y - Y_n}{- b (U - U_n)}$$

where b is a positive constant, U is unemployment, and U_n is the natural rate of unemployment or NAIRU, we arrive at the final form of the short-run Phillips curve:

$$\pi = \pi_e - b(U - U_n) + v$$

This equation, plotting inflation rate π against unemployment U gives the downward-sloping curve in the diagram that characterizes the Phillips curve.

With respect to the variables of concern (inflation and unemployment), the above equation 11 was functionally written as;

$$INF = UNEM$$

Making unemployment the subject of formula, being the one of the concerns of this study to examine the impact of inflation on unemployment, the equation is stated thus;

$$UNEM = f (INF)$$

This model was adopted in the work of Odo et el (2017) and to accommodate the variables used in the study and establish control variables, the equation three (5) is modified and stated functionally as

$$UNEM = f (INF, TGEX, FDI)$$

Where, UNEM = Unemployment, INF = Inflation, TGEX = Total government expenditure and FDI = Foreign Direct Investment.

In order to model for estimation, the Philips model and some control variables that has correlation with unemployment were estimated and presented in a linear form as follows;

$$UNEM_t = \beta_0 + \beta_1 INF_{t-1} + \beta_2 \log TGEX_{t-1} + \beta_3 \log FDI_{t-1} + \mu_t$$

β_0 = Constant term, β_1- β_7 = Regression coefficients of both dependent and independent variables specified; μ_t = Error Term

Based on the variables of interest, the appriori expectation is stated as, increase in inflation leads to decrease in unemployment, explaining an inverse relationship.

RESULT
Descriptive Statistics (**Stability and Reliability Test)**
This is a process of showing the characteristics of data employed in the study. The analysis determines the trend or paradigm in time series using graphs or coefficients. The result of the analysis is presented thus;

Table 1: Result of Descriptive Statistics

	UNEM	INF	LTGEX	LFDI
Mean	9.308846	20.05128	730466.3	258692.3
Median	7.000000	12.90000	66584.40	13531.20
Std. Dev.	5.712696	16.31988	1209081.	376885.4
Skewness	0.575511	1.585891	1.965285	0.878474
Kurtosis	2.022528	4.836587	6.066300	1.833916
Jarque-Bera	3.705495	21.82904	40.38381	7.225758
Probability	0.156806	0.000018	0.000000	0.026974

Descriptive statistics result indicated absence of possible outlier in the data employed. It revealed the pattern in the time series with the following coefficients. In small samples, values of Skewness greater or lesser than 1.96 are sufficient to establish normality of the data. From table 1, unemployment rate (UNEM) has a mean value of 9.30, while the maximum and minimum values are 21.10 and 1.90 respectively. Inflation (INF) has a mean value of 20.05, while the maximum and minimum values are 72.8 and 5.40 respectively. Total government expenditure (TGEX) has a mean value of 730466.3, maximum and minimum value of 4828215 and 4605.4 respectively. Foreign direct investment (FDI) has a mean value of 258692.3, while the maximum and minimum values are 888893.0 and 584.90 respectively. The Jarque-Bera statistic indicated that only unemployment rate is normally distributed with the p-value 0.16, while inflation (INF =0.00), total government expenditure (TGEX = 0.00) and foreign direct investment (fdi = 0.02). This output of the mean and S.D means that the variables are closely correlated. Also, the values of Skewness and Kurtosis were used to determine the shape of the distribution of unemployment and inflation data and stated as; 0.5755 and 1.5858. In a normal distribution dataset, Skewness varies from 1.983 to 0.007 while the kurtosis varies from 3.974 to 0.03 for sample between 5 and 5000. Since this value of the skewness is greater than 0, it shows the peak and symmetrical distribution in the dataset. However, if the kurtosis is close to 0, then a normal distribution is often assumed, if the kurtosis is less than zero, then the distribution is light tails and if the kurtosis is greater than zero, then the distribution has heavier tails. The values of kurtosis for the variables employed are, 2.0, 4.8, 6.0 and 1.8 respectively which is greater than 0 and indicates strong normal distribution.

Unit Root Test

The Philip Perron (PP) type of unit root test was employed to determine the existence of unit roots in the data using trend and intercept. The PP was confirmed to produce the same coefficients and p values as the ADF and to avoid duplication, PP was chosen to estimate the stationarity of the variables used. The decision of the results is based on the coefficients of the t-statistics and their probability value.

Table 2: Phillips Perron Unit Root Test

Trend and Intercept (Series at Level)

Series	PP Test Statistics	5% Critical values	Pval.	Remarks
UNEM	-2.743762	-3.533083	0.2260	Not Stationary
INF	-3.005799	-3.533083	0.1440	Not Stationary
LTGEX	-1.942012	-3.533083	0.6132	Not Stationary
LFDI	-1.663135	-3.533083	0.7479	Not Stationary

Sources: Researcher's compilation from E-views 9

Table 3: Phillips Perron Unit Root Test

Trend and Intercept (Series at 1ˢᵗ Difference)

Series	PP Test Statistics	5% Critical values	Pval.	Remarks
UNEM	-5.573406	-3536601	0.0003	Stationary
INF	-9.242478	-3536601	0.0000	Stationary
LTGEX	-36.66236	-3536601	0.0000	Stationary
LFDI	-5.759301	-3.536601	0.0002	Stationary

Sources: Researcher's compilation from E-views 9

Unit root test result of Philip Perron (PP) indicated that the variables unemployment, inflation, total government expenditure and foreign direct investment are not stationary at level but became stationary at 1st difference. This is said to be integrated of the same order 1 (1). This means that the data for the variable are fit for further estimation.

Co-integration Test

Johansen co-integration test was used to test for the presence of co-integration between the series of the same order of integration. Johansen co-integration test for the series; UNEM and the explanatory variables; INF, TGEX and FDI are summarized in this table.

Table 4: Co integration Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
UNEM *	0.709906	70.37986	47.85613	0.0001
INF 1	0.298675	24.59051	29.79707	0.1766
LTGEX 2	0.254082	11.46349	15.49471	0.1845
LFDI 3	0.016546	0.617331	3.841466	0.4320

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-value

Source: E view 9.0, 2019

As observed under unrestricted co-integration rank test, the trace statistics indicated one co-integrating equation. The result of the Johansen co integration test for unemployment, inflation, government expenditure and foreign direct investment indicated one (1) co integrating vector as shown in table 3 depicting the existence of stable long run relationship between the dependent and independent variables. This implies that the result of the estimation can be relied upon in taking long run decisions in the economy within the study period. This result agrees with the findings in Hemish (2017), Sunusi and Ahmad (2017), Ademola, & Badiru (2016), Peter, Adewale & James (2016), whose studies indicated long run relationship between unemployment and inflation and disagrees with the finding of Hussein (2014) that reported no existence of cointegration between the twin variables.

The cointegrating equation is stated thus;

UNEM = 0.21 + 0.16INF – 4.1TGEX – 3.33FDI

The implication of this equation is that holding inflation, TGEX and FDI constant, the Nigerian economy will adjust in the long run by 21 percent.

Vector Error Correction Mechanism

The essence of this estimation procedure is to ascertain the speed of adjustment since the deviation from the long run equilibrium is corrected through the short run adjustments. Having established that there is co-integration equation among the variables, the study confirms the reason to estimate the vector error correction model (VECM). The result for the VECM is stated in table 5 below:

Table 5: VECM Test

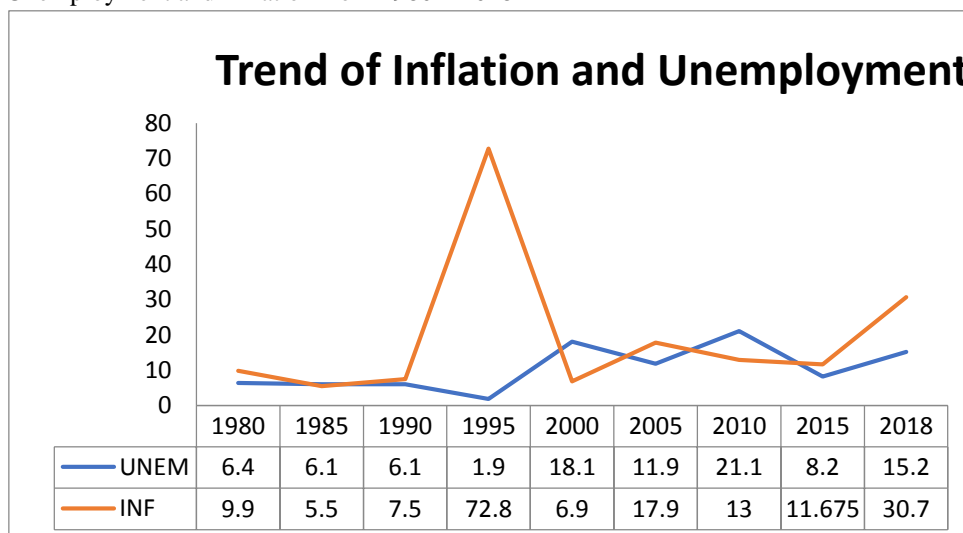| Error correction	Coefficient	Std. Error	T - statistics	P – values
ECT = C(1)	-0.570437	0.09069	-6.28984	0.0000
D(UNEM(-1)) = C(2)	0.257567	0.115255	2.234763	0.0328
D(INF(-1)) = C(3)	0.066014	0.029369	2.247717	0.0319
D(LTGEX(-1)) = C(4)	-2.31E-06	3.80E-07	-6.087891	0.0000
D(LFDI(-1)) = C(5)	-2.83E-7	4.21E-06	-0.067142	0.9469
C = C (6)	0.207702	0.415886	0.499420	0.6210

Source: E-view 9.0, 2019

ECT which stands for error correction term met the required conditions. Result of the ECM was significant indicating that inverse and statistically significant of ECT coefficients are essential conditions in order that any disequilibrium to be corrected. In light of this, the coefficient of ECT (-1) = --0.570437. Inverse result of ECT satisfied one condition and the P-value [0.0000 < 5% [0.05] critical value satisfied another condition of being statistically significant. This result indicated that the speed of adjustment amid the short run dynamics and the long run equilibrium is 57%. Thus, ECT will adequately act to correct any deviations of the short run dynamics to its long-run equilibrium by 57% annually.

Computed coefficient of multiple determination (R^2) value of 0.623609 showed that 62% of total change in unemployment is accounted for, by the explanatory variables: inflation (INF), government expenditure (TGEX) and foreign direct investment (FDI) while 28% of the changes in unemployment can be attributed to other factors not included in the regression equation influence. F – Statistics = 10.27222, with p value of 0.000007 which is less than 0.05 shows that explanatory variables jointly influence dependent variable significantly.

Figure 5: Trend of Unemployment and Inflation from 1980 – 2018

Trend of Inflation and Unemployment

	1980	1985	1990	1995	2000	2005	2010	2015	2018
UNEM	6.4	6.1	6.1	1.9	18.1	11.9	21.1	8.2	15.2
INF	9.9	5.5	7.5	72.8	6.9	17.9	13	11.675	30.7

Source: Excel Output, 2019

The appriori expectation using Philip's hypothesis stated that in the short run, there is a trade-off between inflation and unemployment, showing an inverse relationship between unemployment and inflation. This means that an as inflation increase in an economy, the unemployment rate decreases and vice versa. The implication is that workers demand for increase in money (wage) to meet up with the rising inflation.

From the graph above, the inflation – unemployment relationship at five (5) years interval failed to follow a consistent trend. This implies that the trend is against the theory of inflation and unemployment, thereby not working according to the appriori expectation. Although much research has been conducted to empirically investigate the nature of the relationship between inflation and unemployment, yet, the inability of the Nigerian economic managers to reduce the concerned variables from its persistent double digit level over time calls for more investigation.

In order to determine the probability that a given hypothesis is true or false Statistics are employed. Hypotheses are of two types namely null and alternative hypothesis. So in testing the first to third hypotheses, p-value of the t-statistics in VECM are employed, while the p-value of the f-statistics in VEC Granger is used for the fourth hypothesis.
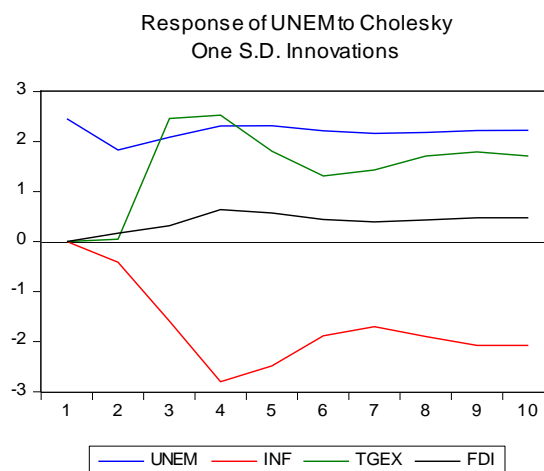
HYPOTHESIS ONE
Inflation does not have any significant impact on unemployment in Nigeria within the period of study.
Decision rule: if the p-value of the t-statistics in VECM is less than 5% critical value the null hypothesis is rejected.

Figure 5: Impulse Response of unemployment and inflation

Response of UNEM to Cholesky One S.D. Innovations

Source: E-view 9.0

Using impulse response graphical estimation to establish the relationship between inflation and unemployment; it is realized that there was inconsistency in the trend of inflation and unemployment. As unemployment increases, inflation decreases initially, it increases and later decreases.

From the hypotheses tested, the system equation revealed that inflation has a positive significant impact on unemployment in Nigeria with the coefficient of 0.066014 and p value of 0.0319. This means that one percent increase in inflation leads to six percent increase in unemployment which is not in line with the Philip's curve hypothesis that states an inverse relationship between inflation and unemployment. This agrees with the work of Odo et al (2017) and contrary to the result of Okafor et al (2016) that revealed that inflation impact negatively on unemployment.

Hypothesis Two: Government expenditure has no significant impact on unemployment
The result from hypothesis two estimation indicated that government expenditure has a negative significant impact on unemployment with the coefficient of -2.31 and p value of 0.0000, so, we reject the null hypothesis and conclude that government spending has a significant impact on unemployment in Nigeria within the period of study. This means that 1 percent increase in government spending leads to 23 percent decrease in unemployment. This result is in line with the Wagner's postulation of public expenditure, explained in the work of Wijeweera (2009), which states that increase in government spending leads to reduction in unemployment through increase in industrial output. This is contrary to the work of O'Nwachukwu (2017), whose result revealed a positive impact of government expenditure on unemployment.

Hypothesis Three: Foreign direct investment has no significant impact on unemployment
Foreign direct investment has negative insignificant impact on unemployment within the period of study with the coefficient of -2.83 and p value of 0.9469. This means that I percent increase in foreign direct investment leads to 28.3 percent reduction in unemployment, but insignificantly. This result agrees with the FDI the traditional argument which states that an inflow of FDI improves economic growth and thereby enhances employment opportunities, (Syed and Mohammed, 2009). With the result above and the later assertion, increase in FDI leads to creation of employment and reduces unemployment in Nigeria within the period of study. This result agrees with the result of Johnny et al (2018) which revealed the view of the Neo-liberal school of thought on FDI and unemployment.

Hypothesis four: There is no causal relationship between inflation and unemployment
The VEC Granger causality test was adopted to evaluate the degree of causality between unemployment and inflation in Nigeria. From the result, the p values of 0.0246 for INF is less than 0.05, showing that causality exists and run from inflation to

unemployment in Nigeria within the period of study. This agrees with the outcome of the error correction term, that is, a negative error correction term implies causality among the dependent and independent variables as it is indicative of the speed of adjustment from the short run to long run equilibrium in the event of distortions in the economy. And disagrees with the result of Badreldin et al (2016) that found that inflation does not granger cause unemployment. Causality was also found from government expenditure to unemployment with the p value of 0.0000. This result is supported by table 6 below.

Table 6: VEC Granger Causality Test

Null Hypothesis:	df	Prob.
INF does not Granger Cause UNEM	1	0.0246
UNEM does not Granger Cause INF 1		0.5492
LTGEX does not Granger Cause UNEM	1	0.0000
UNEM does not Granger Cause LTGEX 1		0.6547
LFDI does not Granger Cause UNEM	1	0.9465
UNEM does not Granger Cause LFDI 1		0.8327

Source: E view Output, 2019

IMPLICATION OF THE RESULTS

The researcher analyzed the implications of the result in line with the tested hypotheses discussing the results as it affects the Nigerian economy.

The implication of inverse and statistically significant ECT coefficients (-0.570437) is its essentiality in the correction or restoration of any disequilibrium in the Nigerian economy, meaning that in the face of disequilibrium in the short run; it will take 57% for the economy to recover to equilibrium in the long run annually. This could be achieved through government fiscal policy interventions. From the result, inflation has positive significant impact on unemployment. This means that increase in inflation will lead to increase in unemployment which is against the economic theory (Philip's hypothesis). This result indicates the presence of stagflation in the economy characterized by high unemployment, rising prices and low growth. Such economic situation could be attributed to negative supply shocks like; low FDI, low productivity increases in oil prices which most times increases the resource prices of other goods and decrease aggregate supply. When aggregate supply decreases, real output also decreases, and then transcend to increase in unemployment. Invariably, the Philip's curve cannot represent a predictable trade – off between unemployment and inflation which claimed mutually exclusive.

Considering other control variables, TGEX, FDI and UNEM, the negative significant impact of government expenditure on unemployment implies that as government spending increases, unemployment rate reduces as postulated by economic theory with its negative sign. This is explained as government spending prevents recession and reverses the effect of recession with immediate revival of the economy. The significant impact could be attributed to the huge amount of money annually budget to capital expenditure which creates jobs.

Foreign direct investment has negative insignificant impact on unemployment. This means that I percent increase in foreign direct investment leads to 28.3 percent reduction in unemployment, but insignificantly. The implication of the result is that through foreign direct investment much of needed economic fortune can be achieved and can provide crucial aid in modernizing the industrial sector by which employment is created. More so, enabling environment and investment platforms strongly stimulates effective and efficient national output. The insignificant position of FDI to unemployment is attributable to massive commitment of foreign direct investment inflows into the oil sector where there are little or no opportunity for the employment of Nigerians due to over reliance on expatriates.

There exists the presence of causality between unemployment and inflation with a unidirectional causality between them. Inflation causes unemployment when there is lower investment and economic growth in the long term as firms are discouraged from investing,

leading to a higher unemployment rate in the long run. Another implication is that when inflationary growth is unsustainable leading to boom in economic cycle (ie, the economic growth is faster than the long run trend rate, leading to demand pull inflation where demand is higher than supply). It also leads to decline in competiveness and lower export demand, causing unemployment in the export sector. More so, inflation through monetary side can push interest high and a sharp increase in interest rates can cause economic growth to fall leading to recession and unemployment.

In view of the above findings, the study makes the following recommendations;

i.   A discretionary monetary/fiscal policy management that focuses on inflationary control.

ii.   Government should create conducive environment, in terms of provision of adequate security, avoidance of multiple taxation and ensuring political stability which will serve as a trigger in foreign direct inflow and consequently reduce unemployment.

iii.   Government should consciously increase fiscal space for capital activities and projects that are capable of generating income, increase domestic and public spending, improve economic status and reduce unemployment.

This paper concludes that the Philip's curve hypothesis does not apply in Nigeria within the period of study as the result failed to establish an inverse relationship as postulated by A.W. Philips.

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