Relative Impact of Inflation and Unemployment on Economic Growth in Nigeria (1980-2013)

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Abstract

This study is on the quantitative analysis of the relative impact of inflation and unemployment on economic growth in Nigeria for the sample period 1980 to 2013. The econometric technique adopted for the study was multiple regression method based on ordinary least squares technique. However, in order to avoid the incidence of spurious estimates, evidence from the ADF test conducted revealed that the variables are integrated of order two,1(2). The Johansen cointegration test conducted showed evidence of long run equilibrium relationship between unemployment, inflation and gross domestic growth in Nigeria The findings revealed that the estimated longrun parameters with computed t-values of -2.605927 and -4.001583 for unemployment and inflation respectively, were highly significant at 5% levels. It also showed that both unemployment and inflation rate were inversely related with gross domestic product (GDP). The Granger causality test gave F-values of 1.94614 and 1.54103 for INF ® UNE and UNE ® INF (the arrow indicates the direction of causality) when compared with 5% theoretical F-value of 4.28. Since none of the two competed F-values was significant, the implication was that they were independent of each other. The policy recommendations therefore, are that the Central Bank of Nigeria should pursue more vigorously and transparently its policy of inflation targeting as well as reviving the energy sector to absorb millions of graduate unemployed youths.

Keywords: Cointegration, Unemployment, Inflation, Economic growth, Spurious estimates, Equilibruim

SECTION ONE: INTRODUCTION

Background to the study

Inflation and unemployment had become a central issue to policy makers and analysts both in developed and developing nations of the world, Nigeria like. Efforts towards bringing- inflation under effective control was clearly expressed in the Central Bank of Nigeria (CBN) mandate of promotion and maintenance of monetary stability with a sound and efficient financial system. (Ibeabuchi, 2007). On the other hand, the alarming dimension of unemployment in Nigeria beginning from the 1980s gave rise to the establishment of the National Directorate of Employment (NDE) in 1986, charged with the statutory responsibility of creating employment. Prior to the National Directorate of Employment was the establishment of the National Manpower Board in 1962, also charged with the responsibility for employment policies, including measures to deal with unemployment and the utilization of optimal manpower resources (Damachi, 2001).

Unemployment had remained one of the most stubborn problem facing macroeconomic policy makers in Nigeria since independence in 1960. The matter had become worse with the graduate unemployment which began in the 1980s. Even the structural Adjustment Policy (SAP) adopted in 1986 ended up in aggravating the unemployment problem since it resulted in massive retrenchment of workers both in the public and private sectors, particularly in the manufacturing sector. No meaningful development could take place when a considerable percentage of the labour force was unemployed.

In 2003, the Federal Government adopted the National Economic Empowerment and Development Strategy (NEEDS). It aimed at reducing inflation, facilitating access to credit for businesses, and creating jobs in the millions. The manner of its adoption was fancifully and joyfully played with acronyms such that the state version of NEEDS, which it called SEEDS, and Local Government version called LEEDS in 2003. Inspite of all these policies, unemployment and inflation pressures had continued to be on the increase.

Inflation generally refers to a situation of persistent or sustained upward rise in the general price level. It should be carefully noted that increases in the price of some goods is not inflationary if compensated by falls in the prices of other goods. As observed by Killick (1981), it is necessary to distinguish inflation from an economic phenomena of a one-time increase in prices, or when there are price increases in a narrow group of economic goods and services. The economic problems posed by inflation can be far-reaching. For example, it undermined the role of money as a store of value, and, in addition, frustrated investment, national output, growth and the general standard of living. As a matter of fact, the negative effects of inflation on economic growth had been explored in many studies,   (Barro, 1995; Bruno and Easterly, 1995; and Gosh and Philips, 1998). As a thorny issue besetting all economies, Reagan (2008) described inflation as being "as violent as a mugger, as frightening as an armed robber, and as deadly as a hit-man".

On the other hand, a person is unemployed when he or she is able and willing to work, actively looking for work but does not have work. The macroeconomic objective of any nation is to achieve full employment and confine inflation in the price level to limits that do not interfere with the effective operation of the economy. The employment opportunities provided by any economy serve as a barometer for measuring economic performance. A gainfully employed labour force and an active population as contended by Englama (2001), have the potentials to contribute to the growth of national output for the promotion of economic development. In view of this, the issues of population, employment, unemployment, underemployment and economic development are closely related. The existence of' unemployment in any economy was a source of concern to policy makers and the general citizenry. A high level of unemployment implied loss of output and income. Layard et al (1994) put it that unemployment generally reduced output and aggregate income, causing inequality, since the unemployed lost more than the employed. According to them, unemployment not only eroded human capital but also involved psychic costs. Okun (1962), observed also that unemployment implied not only actual output but less than potential output constituted a wastage of resources, because goods and services that could have been produced were forgone. Unemployment therefore, caused poverty, inequality, social unrest and a state of hopelessness to the unemployed. The recent youth restiveness in the Niger Delta region was a pointer to this fact. Similarly, the problem of armed robbery and other social vices could also be traced to unemployment as confessions obtained from many armed robbery suspects in most cases were that they were led into the crime on account of unemployment.

The world bank had predicted that the Nigerian economy would grow at a double digit rate in 2011 and beyond with the country's new focus on investment; and that Nigeria had recorded a GDP growth of 10.3%, 10.6%, 5.4%, 6.2%, 7%, 6%, 7% and 7.4% in 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012 and 2013 respectively, while in the opinion of Ochigbo (2011), the country's economy was expected to grow by 7.8% in 2014. This was in spite of the lull in economic growth triggered by the global economic crisis. With the creation of a new ministry to take charge of trade and investment, the country was on the right track towards achieving its objective of becoming one of the 20 leading economies by 2020.

In the present times, two lines of argument concerning inflation and economic growth exist. While one school of thought viewed inflation as anti growth, the other, the structuralists, postulates that inflation would accompany economic growth as a result of disequilibria created by structural changes which were necessary for development process (Killick, 1981:172). According to them, there was always a trade-off between rising prices and growth, implying that a society which gave priority to growth must be willing to tolerate the inflation that came with it. They also argued in favour of deliberate pursuit of inflationary credit creation as a means of accelerating growth. Some of the questions which this paper intended to address are as follows:

   i.   What are the short run and long run impacts of inflation and unemployment on economic activities in Nigeria?
   ii. Are there any causal relationship between inflation and unemployment in Nigeria?
   iii. Are inflation and unemployment dynamics in Nigeria in consonance with Philips (1958) theory of inverse relationship in the short run and Friedman's (1977) theory of long run direct relationship?

In view of the theories that inflation and unemployment, though inversely related, exist together and affect the level of economic activities, the specific objectives of this paper were to:

   i.   Determine the short run and long run impact of inflation and unemployment on economic activities in Nigeria.
   ii. Establish the existence or not of any causal re1ationship between inflation and unemployment in the Nigerian economy; and
   iii. Use data on Nigerian economy to test the validity of Philips (1958) and Friedman's (1977) theories of short run inverse correlation and long run positive correlation between inflation and unemployment.

Statement of the problem
Ever since the 1980s Nigeria has continued to wage a relentless war against the twin evils of inflation and unemployment, with the active use of monetary and fiscal policies. As observed by Iyoha (2004), the use of these policies had always resulted in what he described as "overshooting" and the phenomenon of policy-induced cyclical fluctuations in the gross national product (GNP). Besides, it had been found that the goals of full employment and stable prices are largely incompatible.

In Nigeria, over-dependence of the economy on oil brought a boom in the 1970s while economic recession set in since 1981. The recession has had a very significant implication for the utilization of the country's human resources, leading to very high level of unemployment. The problem had aggravated to the extent that many university graduates could not secure jobs, let alone secondary and primary school leavers. Despite various government policies and programmes aimed at reducing unemployment among the youths and adults, the problem remained unabated. The phenomenon of stagflation in the 1970s and 1980s had gone further

to complicate the conduct of monetary and fiscal policies aimed at remedying unemployment. Stagflation was a situation of simultaneous occurrence of rising inflation and unemployment. The Structural Adjustment Programme (SAP) adopted in 1986 had in no small measure ended up in aggravating the problems of unemployment due to retrenchment of workers in the private and public sectors of the economy. These retrenchment exercises resulted in fall of output vis-à-vis a relatively higher demand pressure.

Most of the works done in this subject area such as Adeyeye and Fakiyesi (1980), Egwaikhide (1994), Englama (2001), Lawanson (2007), Akinbobola (2012) had been strictly on either inflation or unemployment alone. None had gone to the extent of analyzing their relative impacts on the economy, either in the short run or in the long run, or to determine the existence of any causal relationship between them. The determination of the existence or not of any causal relationship between inflation and unemployment and their relative impacts on the economy would aid in no small measure the selection of appropriate policy mix in reducing them to their barest minimum.

RESEARCH QUESTIONS
Some of the questions which this paper intended to address are as follows:
  i.   What are the short run and long run impacts of inflation and unemployment on economic activities in Nigeria?
  ii.   Is there any causal relationship between inflation and unemployment in Nigeria?
  iii. Are inflation and unemployment dynamics in Nigeria in consonance with Philip's (1958) and Friedman's (1977) theories or postulations of short run inverse relationship, and long run direct relationship, respectively?

Statement of Research Objectives
In view of the existing Philip's and Friedman's theories, inflation and unemployment, though inversely related, existed together and affected the level of economic activities, the broad objective of this study is to empirically analyze the relative impact of inflation and unemployment on Nigerian economy. Specifically, the objectives are to:
  i.   analyze the short run and long run impact of inflation and unemployment on economic activities in Nigeria,
  ii.   establish the existence of any causal relationship between inflation and unemployment in the Nigerian economy, and
  iii. test the validity of Philip's (1958) and Friedman's (1977) theories of short run inverse correlation, and long run positive correlation between inflation and unemployment.

Statement of Research Hypotheses
This research is guided by the following hypotheses:
  i.   Ho1: bi = 0,   Changes in inflation and unemployment rates in Nigeria do not significantly affect economic activities in Nigeria, both in the   short run and long run.
  ii.   Ho2:   bi = 0,   There is no significant causal relationship between changes in inflation and changes in unemployment in Nigeria.
  iii. Ho3: bi = 0,   The relationship between inflation and unemployment is not significantly related with Philip's (1958) and Friedman's short run and long run theories about inflation and unemployment.

Significance of the study
Economic performance seems to be determined mainly by a country's macroeconomic framework. Most African countries, Nigeria inclusive, have been bedeviled by the problem of poor domestic macroeconomic management. Right from the 1980s, this internal problem of

poor domestic macroeconomic management has been exacerbated by unfavorable external factors such as the oil glut, leading to an acute economic crisis characterized by persistent inflation, high unemployment, stagnation, etc.

When the relative impact of inflation and unemployment on the Nigerian economy are empirically analysed and determined, lessons from this study will be of immense value to the authority responsible for the formulation and implementation of macroeconomic policies in Nigeria. With the direction of causality between inflation and unemployment also established, macroeconomic policy makers will be in a better position to select the appropriate mix of macroeconomic instruments that could reduce inflation and unemployment to levels that might not adversely affect the welfare of the people, and ensure, in addition, the effective working of the market system.

The findings of this study will in no small measure equip the Central Bank Nigeria (CBN) with the true nature and extent of the relationship between inflation and unemployment in Nigeria. This will enable it select appropriate monetary and fiscal policies to achieve desired combinations of inflation and unemployment. In other words, it will provide a guideline to the CBN authorities about the rate of inflation which can be tolerated with a given level of unemployment.

Results obtained from this research will provide a reference document for scholars and researchers who may want to delve further into the subject matter.

Finally, findings from this study would serve as a background upon which further researches in this area would be conducted.

Scope and limitations of the study

This study was an empirical analysis of the relative impact of inflation and unemployment on the Nigerian economy for the sample period 1980 to 2009. The variables employed in the analysis were Gross Domestic Product (GDP) which served as a proxy for Nigerian economic growth, growth rate of unemployment (GUNE), and inflation rate (INFR).

However, this study was not concerned with the discussion of factors that caused either inflation or unemployment, or the types of inflation and unemployment. Knowledge of their causes and types were taken for granted as they were replete in most economic literature.

A limitation worthy of mention here was data limitations resulting from the poor state of statistical information in Nigeria. Apart from underestimation of economic activities, data inconsistencies were rampant. Data from different sources tended to give different information on a variable for a particular period. Furthermore, there were long time lags in the reporting and compilation of certain information, making it difficult to update data.

Apart from the above-mentioned limitations capable of adversely affecting the accuracy of any research findings, all other errors and omissions were entirely those of the researcher. Nevertheless, the conduct of this research was very successful.

SECTION TWO: REVIEW OF RELATED LITERATURE

Theoretical Literature

Modern macroeconomic theories on inflation and unemployment saw an inverse correlation between the two as explained by the Philips (1958) curve. The notion that there existed a stable inverse relationship between inflation and the rate of unemployment gained acceptance in the 1960s, but, in the mid 1970s, after a dramatic rise in both inflation and unemployment the two variables began to move together, in open defiance of the Philips curve. The positive correlation between inflation and unemployment which Friedman (1977) noted in the 1970s was subsequently replaced by a negative correlation as the early 1980s saw disinflation which was inflation accompanied by recessions. Today, most economists view inflation and unemployment movements as reflecting aggregate demand and supply disturbances as well as the dynamic adjustments the economy follows in response to these disturbances.

For example, when demand disturbances dominated, inflation and unemployment would tend to be negatively correlated, but when supply disturbances dominated, inflation and unemployment would tend to move in the same direction (Killick, 1981: 166).

The economic belief before 1930, generally referred to the classical economics, with their chief proponent Smith (1776), propounded the theory that the economy would always maintain full employment level of output and resources. This was because the demand for labour would always equal the supply of labour at the prevailing wage rate. If for any reason, there was an increase in labour supply, money wages would fall and more workers would be employed. In the same way, if there was shortage of workers, money wage would rise eliminating the shortage. Thus, in the classical sense, there would never be involuntary unemployment.

However, with the great depression of the 1930s, Keynes (1936), attributed the observed unemployment to insufficient aggregate demand. Keynes assumed that workers were unwilling to accept a cut in money wages in order to secure more employment. Even though they would accept an equivalent reduction in the real wage brought about by an increase in the price level (inflation) while money wage rate remained unchanged. Essentially, Keynes examined the relationship between the quantity of money and prices both under unemployment and full employment situations, concluding that as long as there was unemployment, output and employment would change in the same proportion as the quantity of money, with no change in prices.

Unfortunately, the theory fails to appreciate the true nature of money and assumed that money could be exchanged for bonds only. In response to the weaknesses of Keynesian theory, the New-Keynesian theoretical exposition combined both aggregate demand and aggregate supply by assuming Keynesian shortrun view as well as classical longrun view. Here, they maintained that inflation depended on the level of potential output or natural rate of unemployment. However, the exact level of potential output or natural rate of unemployment was generally unknown and tended to change overtime.

Yesufu (2000) observed that a new and profound cause of unemployment also derived from attempts to manage the economy with policy instruments that were irrelevant, ill advised or far in advance of the stage of development. Curiously, these instruments were wrongly fashioned in line with the economies of advanced nations, and insisted upon by some international organizations, notably the International Monetary Fund (IMF) and the World Bank (IBRD). The enforcement of the type of Structural Adjustment Programme (SAP) that was imposed upon Nigeria in 1986 was a typical example.

According to Katsouli and Pallis (2006) numerous econometric models had been used to obtain estimates of the relationship between inflation and unemployment. On the basis of a review of alternative theoretical approaches, it was concluded that a reduced – form Philips curve framework was the most suitable for the task of estimating this relationship. This was because it provided a direct link to the relationship between inflation and unemployment and was consistent with a variety of structural approaches.

In the view of Pallis and Katsouli (2003), it might be said that the main problem in the estimation of the relationship between inflation and unemployment, using Philips curve specification, was the uncertainty surrounding the estimates of the natural rate of unemployment, and therefore, it was important any contribution to this area to be concentrated on new specifications of the equations involved and on new estimating techniques that would add to our knowledge.

As observed by Olivier (2011), the Philips curve postulates an inverse relationship or a trade-off between the rate of unemployment and inflation. According to him, an increase in aggregate demand due to reduced unemployment results in increased inflation, suggesting the extent to which monetary and fiscal policies can be used to control inflation without high levels of unemployment.

Dornbusch et al (2004), observed that inflation, economic growth, and unemployment were related through the business cycle. According to them, the business cycle was more or less of a regular pattern of expansion (recovery) and contraction (recession) in economic activity around the path of trend growth. At a cyclical peak, economic activity was high relative to trend, while at a cyclical trough, economic activity was low relative to trend. Inflation, growth and unemployment all have clear cyclical patterns. The trend path of GDP is the path it would take if factors of production were fully employed. But, output was not always at its trend level, that is, the level corresponding to full employment of factors of production. Rather, output fluctuates around the trend level. During an expansion (or recovery), the employment of factors of production increases, and that was a source of increased production. Conversely, during a recession unemployment increases and less output was produced than could in fact be produced with the existing resources and technology.

Leke (2011), demonstrated with data the rising concern over unemployment in Nigeria. According to him, Nigeria has about 90 million people who were willing and able to work, but about 70 million of them had no jobs. This represented a very serious impediment to Nigeria's economic growth and development because, apart from draining the country's human resources, it generated losses in terms of lower output which resulted in poorer incomes and increased poverty. The national unemployment rate, according to Leke, rose from 4.3% in 1970 to 6.4% in 1980; 40% in 1992, and 41.6% in 2011. He cited erratic power supply as the major reason for the rising unemployment rates, and that many industries had moved to neighbouring West African countries with lower production costs and friendly government policies. During this period, so many factories that hitherto provided employment to graduates and artisans collapsed because energy supply which served as the main engine of production became comatose forcing surviving industries to depend on power generators. The country was faced with a gross abuse and under-utilization of human resources with direct impact on national productivity and competitiveness.

Empirical Literature

Although much empirical researches had been undertaken for various countries using different data and sample periods, the most revealing interchange took place between Rush and Waldo (1988) and Pesaran (1988). Pesaran (1982) produced a non-nested Keynesian model of unemployment which rejected Barro's (1995) model without itself being rejected by the new classical model. However, Rush and Waldo (1988) argued that Pesaran's version of the new classical model could be improved by taking account of the fact that when it was known that any war was over, the public will anticipate a reduction in government spending. In other words, they argued that the Keynesian model proposed by Pesaran (l982) could be rejected in favour of their improved new classical model.

Aron and Muellbauer (2000) examined multi-step models for inflation and output. The empirical results confirmed the importance of the output gap and exchange rate for forecasting inflation. Using a parsimonious and empirically stable error-correction model, Williams .and Adedeji (2004), found that the major determinants of inflation were changes in monetary aggregates, real output, foreign price levels and exchange rates. Also, Khan and Schimmelpfeining (2006) showed that monetary factors were the main drivers of inflation.

Interesting studies on Nigeria's inflation include: Adeyeye and Fakiyesi (1980), Osakwe (1983), Ajakaiye and Ojowu (1994), and Egwaikhide et al (1994). All these studies seemed to find explanation in both monetary and structural factors as being responsible for the upward pressure on the general price level in Nigeria.

With regards to Nigeria, Oyejide (1972) examined the impact of deficit financing in the Nigerian inflation process and concluded that there was the existence of direct relationship between inflation and various measures of deficit financing. However, Ajayi and Awosika (1980) found that inflation in Nigeria was explained more by external factors in contrast to internal influences. Using quarterly data, Osakwe (1983) identified money wage rate and money supply as the two most important factors during the period. Pinto (1987), independently showed that the monetization of foreign exchange earnings from crude oil export constituted the single most important factor explaining the inflationary process in Nigeria from the 1970s to the early 1980s, Ocran (2007) in a study sought to ascertain the key determinants of inflation in Ghana for the past forty years using Johnanson Cointegration test and an error-correction model, identified inflation inertia, changes in money, and changes in government treasury bill rates, as well as changes in exchange rates as determinants of inflation in the shortrun.

As demonstrated by Pondexter (1981), Delong (2002), and lyoha (2004), the consequences of unemployment were low output, low savings and investments, low income and low standard of living. In turn, Todaro (1980) viewed unemployment as a vicious circle with its principal manifestations in factors contributing to low levels of living and inadequate or inefficient utilization of labour in developing nations in comparison with developed nations.

Holod (2000) explored an identified vector autoregression in modeling the relationship between consumer price index (CPI), money supply and exchange rate in Ukraine. The results show that exchange rate shocks significantly influence the price level. The study further revealed that money supply responds to positive shocks in the price level.

Nicolleta and Edward (2001) updated and extended Friedman's (1972) evidence on the lag between monetary policy actions and the response of inflation. Their evidence was based on

the UK and US data for the period 1953-2001 on money growth rates, inflation and interest rates, as well as annual data on money growth and inflation. Their findings reaffirm the result that it takes over a year before monetary policy actions have their peak effect on inflation.

Mahamadu and Philip (2003), explored the relationship between monetary policy, exchange rates, and inflation in Ghana using Error correction mechanism. The empirical result confirms the existence of a longrun equilibrium relationship between inflation, money supply, exchange rate and real income. In line with theory, the findings demonstrate that in the longrun, inflation in Ghana is positively related to money supply and exchange rate, while it is negatively related to income.

Asogu (1991) undertook an empirical investigation based on ten different specifications that covered monetary policy, structural and open economy aspects of inflation in Nigeria. Variables used in the regressions include money supply, industrial production index, import price index, and official exchange rate. In all the models estimated, the character of inflation seems to be well captured. The result suggested that real output, especially industrial output, net exports, current money supply, domestic food prices, and exchange rate changes, were the major determinants of inflation in Nigeria.

Odusola and Akinlo (2001) examined the link between naira depreciation, inflation and output in Nigeria, adopting vector Autoregresion (VAR) and its structural variant. Their results suggest that the adoption of flexible exchange rate system does not necessarily lead to output expansion, particularly in the shortrun, and that the impacts of the lending rate and inflation on output were negative.

Despite Nigeria's real gross domestic product (GDP) of about N29.206 billion in 2010, with the tendency to continue to rise, the country still lacked the capacity to create new jobs for new employees. In his economy review, Bismark (2012), observed that the economy expanded by 7.22% in 2011, and was growing at a pace faster than the global and regional average of 3% and 5.2%, respectively. In his view, despite these indices, the country's unemployment rose to 23.9% in 2011 and might continue to rise in 2012 and 2013. The increases in the rate of unemployment, coupled with the relatively high inflation rate of 10.5% would push Nigeria's misery index upward to 34.4% from 32.9% in 2010. Bismark further noted that because of high level of unemployment, the number of individuals employed in positions which had no correlation to their level of education, in the light of prevailing market conditions were swelling. The question therefore, was, how the economy continued to expand at an average of 7.25% but the situation in the labour market had a different story.

SECTION THREE: METHODOLOGY
Research Design
The methodology applied in this work was basically ordinary least squares (OLS) technique. However, recent developments in empirical research were utilized in the analysis in order to avoid drawing inferences based on spurious or nonsense regressions. These involved conducting the Dickey-Fuller (DF) and the Augmented Dickey-Fuller (ADF) tests to determine the existence or not of unit roots (non stationarity problems) in the variables (Dickey and Fuller (1979).

Cointegration and error-correction modeling were used to determine the existence of longrun relationships among the variables in the models. Granger (1986) causality tests were

conducted to ascertain whether there was any direction of causality between inflation and unemployment.

Model Specification

In order to fully capture the relationship between Gross Domestic Product (GDP) and the explanatory variables namely, inflation and unemployment, both in the shortrun and in the longrun, the parameters of the following structural relationships were estimated and tested.

The following equations between economic growth, inflation and unemployment were estimated and tested:

$$GDP_t = \beta_0 + \beta_1 INFR_t + \beta_2 UNEM_t + U_t \quad --- \quad \text{i}$$

$$\Delta GDP_t = \beta_1 \Delta INFR_t + \beta_2 \Delta UNEM_t + U_t \quad --- \quad \text{ii}$$

Where:

GDPt	=	Current value of Gross Domestic Product
DGDPt	=	Change in Gross Domestic Product (GDPt - GDPt-1)
INFRt	=	Current inflation rate
DINFRt	=	Change in inflation rate.
UNEMt	=	Current unemployment rate.
DUNEMt	=	Change in the rate of unemployment.
Ut	=	Stochastic error term.
bo	=	Constant
b1, b2	=	Parameters to be estimated and tested.

Equations I and II were estimated and their parameters tested for longrun and shortrun relationships only when the variables had been tested and shown to be stationary or integrated of the same order.

For the second objective of establishing the existence or not of any causal relationship between inflation and unemployment, the parameters of the following structural models were estimated and tested using the Granger causality test statistics:

$$UNEM_t = \sum_{i=1}^{n} a_1 INFR_{t-i} + \sum_{i=1}^{n} \beta j UNEM_{t-i} + U_{It} \quad --- \quad \text{III}$$

$$INFR_t = \sum_{i=1}^{n} \lambda_1 INFR_{t-i} + \sum_{i=1}^{n} \delta j UNEM_{t-i} + U_{2t} \quad --- \quad \text{IV}$$

where it is assumed that the stochastic error terms UIt and U2t are uncorrelated. Equation III postulates that current level of unemployment is related to past values of itself as well as past levels of inflation, and equation IV postulates a similar behaviour for inflation. This study may distinguish any of the following four cases as demonstrated by Giyarati (2009).

i. UNIDIRECTIONAL CAUSALITY FROM INFR to UNEM was indicated if the estimated coefficients of the lagged INFR in equation III was statistically different from zero (ie, a1 0) and the set of estimated coefficient on the lagged UNEM in equation IV was not statistically different from zero (ie, pi = 0).

ii. UNIDIRECTIONAL CAUSALITY FROM UNEM to INFR was indicated if the set of lagged INFR coefficient in equation III is not statistically different from zero, that was, a1 = 0 and the set of lagged UNEM in equation IV was statistically different from zero, that was, .

iii. FEEDBACK or BILATERAL CAUSALITY was indicated when the coefficients of UNEM and INFR were statistically different from zero in both regressions.

iv.   INDEPENDENCE was indicated when the sets of UNEM and INFR coefficients were not statistically significant in both regression.

For the test statistic, we apply the F-test given by $F = \dfrac{(RSS_R - RSS_{UR})/m}{RSS_{UR/n-k}}$

This statistic follows the F distribution with m and (n-k) degrees of freedom for the numerator and the denominator, respectively.

The third objectives will be determined based on the signs of the estimated coefficients of equations I and II.

Data Discussions

The data employed in this research were Real Gross Domestic Product (RGDP), a proxy for economic growth performance. It is the real value of all final goods and services produced in Nigeria over a period of one year; Next was, the Growth rate of unemployment (GUNE) in Nigeria, that is, the ratio of the unemployed to the labour force, and finally was the inflation rate (INF) which is the rate at which the price level increases.

Sources of Data Employed

The data for this study were obtained from the following sources:

    i.   Central Bank of Nigeria (CBN) Economic and Financial Review from 1980 to 2009
    ii.   Central Bank of Nigeria (CBN) Statistical Bulletin from 1980-2009, and,
   iii.   Central Bank of Nigeria (CBN) Annual Report and Statement of Accounts from 1980 to 2009.

SECTION FOUR: RESULTS AND DISCUSSIONS

Unit Root Tests

Appendix I showed the empirical results which indicated that the unit root tests conducted on the variables, namely, Unemployment, Inflation and Gross Domestic Product were all integrated of order two, 1(2). In other words, they exhibited random walk characteristics and became stationary after second differencing. When variables were not stationary in their level forms, they could be made stationary by using their differences. However, as demonstrated by Gujarati (1995), solving nonstationarity problems through differencing of data may lose valuable information about the longrun relationships between the variables that were given by their levels.

The integration of the variables of the same order became a motivation for the researcher to probe further into the existence or not of a longrun equilibrium relationship among the variables using Johanson and Juselius (1990) Maximum Likelihood Ratio to test for their cointegration. The likelihood ratios indicated that the variables, namely, unemployment (UNE), inflation (INFR) and gross domestic product (GDP) were stationary at 5% significance levels. This implied that even though the variables were nonstationary at their levels, estimates arising from their OLS regression equation could no longer be spurious.

The error correction model (ECM) with a positive coefficient of 0.840212, and significance too, indicated the explosive behaviour of unemployment and inflationary crisis in Nigeria.

As shown in the longrun model (see Appendix II);
$InGDP = 1.205365 - 2.080773InUNE - 0.452835InINF$ - - - - - - - - - - - - v
$Se = (0.990680) \quad (0.798477) \quad (0.113164)$

$$t = (1.216705) \quad (-2.605927) \quad (-4.001583)$$

$$R^2 = 0.576073$$

$$\overline{R^2} = 0.563681 \qquad F = 83.83553 \qquad D-W = 1.350222$$

The coefficient of determination R2 which showed the predictive power of the model with a value of 0.563681 implied that the model explained about 56.4% of the variability in Nigeria's economic growth performance. This was intuitively high on the realization that there were other important factors that determined the gross domestic product of a nation which have been deliberately excluded from the model. Both unemployment and inflation variables appeared with negative signs (-2.080773 and -0.452835, respectively) showing inverse relationship with Gross Domestic Product. However, the negative sign of the inflation coefficient did not conform with the structuralist position that a society that gives priority to growth must be willing to tolerate the inflation that comes with it. In a nutshell, their argument, (structuralists), was that inflation redistributed incomes in such a way as to raise saving and investment, thus accelerating growth. The computed t-values of -2.605927 and -4.001583 for unemployment and inflation rates, respectively, supported the view that the two variables were highly significant in the determination of Nigeria's economic growth performance. The F-value of 83.83553 at the relevant degrees of freedom showed that the joint influence of unemployment and inflation factors were highly significant in the determination of Nigeria's Gross Domestic Product.

Holding other factors affecting Gross Domestic Product (GDP) constant, a percentage increase in the rate of unemployment will reduce GDP by about 2.08%, and vice versa, while a percentage increase in the rate of inflation (INFR) will reduce gross domestic product by abut 0.5%, and vice versa.

Finally, the Durbin-Watson value of 1.350222 which is a measure of the existence or not of autocorrelation showed the existence of positive autocorrelation in the model. The implication was the continuous upward trend in the two economic and social problems of unemployment and inflation in Nigeria.

The shortrun regression results, or the differenced model was as shown:

$$\Delta GDP = -7.123855 \Delta UNE - 0.977632 \Delta INF - - - - - - - - - - - - \text{ vi}$$

$$Se = (1.956511) \qquad (0.392109)$$

$$t = (-3.641017) \qquad (-2.493266)$$

$$R^2 = 0.591889$$

$$\overline{R^2} = 0.556962, \qquad AIC = 7.73239, \qquad SIC = 7.828396$$

$$D-W = 3.008274$$

Source: Different regression result in Appendix II

In the shortrun both unemployment and inflation were inversely related to Gross Domestic Product (GDP) and were significant at 5% levels, since the computed t-values of -3.641017 and -2.493266 for unemployment and inflation rates, respectively, were greater than the tabular value of 2.060 at 5% level of significance. In the shortrun, both unemployment and inflation accounted for about 59% of variations in Nigeria's Gross Domestic Product. By differencing the model, we did not have the estimate of the constant term, which had some economic implications that were rather severe. Estimating a regression equation in differenced form told

us whether the dependent variable, in this case, GDP, was going up or down but did not tell us what its level actually was, because we did not have information about the intercept term. The Durbin Watson value of 3.008962 is an indicator of the existence of positive autocorrelation in the model.

Granger Causality Test

Granger (1969) causality tests were used to examine whether any cause and effect relationship existed between two or more variables, inflation and unemployment. The results are shown in the table below:

Table 4.2.1:   Granger Causality Test Results Between Unemployment And Inflation

NULL HYPOTHESIS	OBSERVATION	F-STATISTICS	PROBABILITY
INF does not Granger cause UNE	23	1.94614	0.17830
UNE does not Granger cause INF	23	1.54103	0.22883

Source: Granger causality test results in Appendix I.

The results of the Granger causality tests at 5% significant level and at the relevant degrees of freedom of 1 and 23 for the numerator and the dominator, respectively, gave F-values of 1.94614 and 1.54103 for inflation and unemployment revealed a case of independence when compared with the tabular value of 4.28 (Koutsoyiannis, 1977). This implied that neither inflation nor unemployment Granger cause each other. The implication was that other forces might have been fuelling inflation and unemployment separately.

Finally was the test of the validity of Philips (1958) curve which postulates that there is a trade-off or inverse relationship between inflation and unemployment, and the Friedman's (1977) postulation of a direct and stable longrun relationship between inflation and unemployment. The shortrun and longrun models from Nigerian data on unemployment and inflation were as shown below:

SHORTRUN MODEL

INF_t = -17.81533 UNE   - - - - - - - - - - - - - - - - - - - - - - - -   vii
Se = (2.897810)
t = (-6.147862)
$\overline{R}^2$ = 0.211046,   D-W = 0.072121

LONGRUN MODEL:

INF_t = 3.138181   +   0.007573 UNE_t - - - - - - - - - - - - - - - viii
Se = (0.168871)   (0.001941)
t = (18.58335)   (3.901445)
$\overline{R}^2$ = 0.329034,   F = 15.22127   D-W = 1.004618

The shortrun model showed that inflation and unemployment were inversely related to each other in the Nigerian context, while the longrun model indicated a positive relationship between the two variables. The two models were in conformity with Philips (1958) shortrun and Friedman's (1977) longrun hypotheses.

In the shortrun, one percentage increase in unemployment resulted in about 17.8 percent fall in inflation, and vice versa, while, in the longrun a unit increase in unemployment gave rise to about 0.008 percent in inflation rates, and vice versa. In the shortrun, other factors remaining

constant, an adjusted R-squared value of 0.211046 indicated that unemployment conditions explained about 21% variability in changes in inflation rate. In the longrun, unemployment conditions explained about 33% variability in inflation rates. This was as shown by an adjusted R-sqauared value of 0.329034. The t-values of -6.147862 and 3.901445 in the shorten and longrun, respectively indicated that unemployment had always been a significant determinant of Nigeria's inflationary process. The low levels of Durbin-Watson value of 0.072121 and 1.004618 respectively in the short and longrun indicated the presence of positive autocorrelation in the models. The implication is that inflationary process in Nigeria spills from one period into the next period.

SECTION FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

Summary of results

The result of the analysis revealed the following information:

i. That all the variables, namely, unemployment, inflation, and gross domestic product represented random walk models, that is, they exhibited unit roots, and became stationary after second differencing. In other words, they were integrated of order two, 1(2).

ii. That the integrated of the same order implied, as shown in the Johanson cointegration results, that they were cointegrated at 5% and 1% levels of significance. This was also indicated from the likelihood ratio which were all greater than the 1% and 5% critical values.

iii. The error correction representation coefficient of 0.840212 was shown to be highly significant and positive. This implied that the variables were explosive, and the gap between them increasingly by about 84% each period.

iv. The estimated longrun parameters with computed t-values of -2.605927 and -4.001583 for unemployment and inflation respectively, were highly significant at 5% levels. It also showed that both unemployment and inflation rate were inversely related with gross domestic product (GDP).

v. The longrun model showed an R-squared (R2) and Adjusted R-squared of 0.576073 and 0.563681, respectively, implying that both inflation and unemployment influenced about 57% of the variability in Nigeria's economic growth performance during the sample period.

vi. The longrun model also showed computed F-value of 83.83553 which appeared highly significant, implying that both inflation and unemployment jointly accounted for about 84% of the variability in the gross domestic product. The Durbin-Watson value of 1.350222 indicated the presence of negative autocorrelation in the longrun.

vii. In the shortrun, gross domestic product (GDP) was shown to be inversely related with unemployment and inflation. The estimated t-values of -3.641017 and -2.493266 for unemployment and inflation were very significant at 5% levels. The D-W statistic of 3.008274 was an indicator of positive autocorrelation.

viii. The Granger causality test gave F-values of 1.94614 and 1.54103 for INF ® UNE and UNE ® INF (the arrow indicates the direction of causality) when compared with 5% theoretical F-value of 4.28. Since none of the two competed F-values was significant, the implication was that they were independent of each other.

ix. The longrun regression model of inflation on unemployment showed a direct and positive relationship between inflation and unemployment. The estimated t-value of 3.901445 was highly significant at both 1% and 5% levels. An Adjusted R-squared of 0.329034 was shown to be low. The D-W value was 1.004618. The implication was that in the longrun changes in unemployment caused about 33% changes in inflation rate. However, the D-W value of 1.004618 was an indicator of negative autocorrelation.

CONCLUSION

This study examined the relative impact of inflation and unemployment on Nigerian economy, for the sample period of 1980-2009. It specifically aimed at determining the shortrun and longrun impacts of inflation and unemployment on economic activities in Nigeria, the existence or not of any causal relationship between inflation and unemployment on Nigerian economy in order to test the validity of Philips (1958) and Friedman's (1977) theories concerning the shortrun and longrun relationship between inflation and unemployment.

The empirical analysis revealed that all the variables were random walk process, that is, they trended upwards overtime. It was also shown that both inflation and unemployment were highly significant in the determination of Nigeria's gross domestic product. The inverse relationship both in the short and longruns between the explanatory variables and GDP implied that any increase in the value of either inflation and/or unemployment would tend to drastically reduce the level of Nigeria's Gross Domestic Product, and vice versa. The adjusted R-squared   value of about 57% indicated that unemployment and inflation influenced about 57% variability in Nigeria's economic growth performance. In the longrun, the Durbin-Watson value of 1.350222 showed the existence of autocorrelation, meaning that any underlying shocks to the economy would persist for more than one year.

The Granger causality test conducted at 5% significant level yielded insignificant F-values for both directions of causality. This was a case of independence, meaning that within the sample period neither did inflation cause unemployment nor did unemployment cause inflation. This result was however doubtful.

The shortrun and longrun regressions between inflation and unemployment revealed highly significant t-ratios, though with low coefficient of determination in each case. The shortrun model revealed an inverse relationship between inflation and unemployment, while the longrun model revealed a positive relationship. This is in consonance with Philips (1958) shortrun inverse correlation and Friedman's (1977) longrun positive correlation between inflation and unemployment. Both in the shortrun and longrun, there existed some measure of autocorrelation among the residuals

RECOMMENDATIONS

The policy recommendations therefore, are that the Central Bank of Nigeria should pursue more vigorously and transparently its policy of inflation targeting. When this is successfully done, the effectiveness of monetary and fiscal policies will be enhanced towards the control of unemployment. With regards to unemployment, the investment climate can be significantly improved by improvement in infrastructure such as electricity, roads, communication, and access to credit, thereby, making it possible for more people in Nigeria to do business. The new Ministry of trade and investment should partner with the World Bank in its drive towards increasing the country's inflow of Foreign Direct Investment (FDI), job creation, and wealth generation policies towards the growth of small and medium scale enterprises (SMEs) should be vigorously pursued.

The government should do something urgently to revive the energy sector. This is because energy supply which served as the main engine of production had been comatose, thus forcing industries to depend on power generators and consequently underutilization of human resources. When the energy sector is substantially revived, the capacity-utilization of

industries will rise, employment will rise with direct impact on national productivity and competitiveness. This increase in output will have a downward pressure on inflation rates.

Adequate knowledge of the relationship between inflation and unemployment will suggest to the government the extent to which monetary and fiscal policies can be used to control inflation without high levels of unemployment.

Finally, to avoid a situation of total social breakdown, the trend in unemployment and inflation should not be allowed to continue. This could be done by controlling, through legislative and judiciary processes, the endemic corruption and inept leadership which had been the bane of Nigeria.

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