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Analysis of the Relative Impact of Inflation and Unemployment on Nigerian Economy (1980-2012)

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Abstract
The Nigerian economy has been undergoing the most severe economic crisis of unemployment and inflation ever since the 1980s. Inflation has been staggering well up to double digit rates while unemployment rate has been rising astronomically. These twin economic evils have continued to cause considerable hardship for many Nigerian families and to pose a serious threat to the mental health of substantial proportion of the population. This study therefore aims at not only investigating the relative impact of inflation and unemployment on the level of economic activities in Nigeria but also, employing the Granger Causality test to determine the existence of any causal influence between inflation and unemployment. The empirical results indicate that both inflation and unemployment significantly affect the level of Nigeria's economic performance, and that causality runs from inflation to unemployment. Also revealed is that the two variables are inversely related to economic growth both in the short-run and long-run. And finally, that inflation and unemployment are inversely related to each other in the short=run but directly related in the long-run. The researcher recommends the Central Bank of Nigeria's (CBN) continuous pursuit, vigorously and transparently, the policy of inflation targeting, improvement of infrastructure and access to credit to make it possible for more people to do business in Nigeria. Also recommended is a partnership between the Ministry of Trade and Investment and the World Bank in the formers drive towards increasing foreign direct Investment inflow, job creation, and generation of policies towards the growth of small and medium enterprises (SMEs).
Keywords: Inflation, Granger Causality, Unemployment, Unit root, Co-*integration*

Introduction

Inflation and unemployment have become a central issue to policy makers and analysts both in developed and developing nations of the world, Nigeria inclusive. Efforts towards bringing- inflation under effective control is 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), 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 has remained one of the most stubborn problem facing macroeconomic policy makers in Nigeria since independence in 1960. The matter has 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 can take place when a considerable percentage of the labour force is unemployed.

In 2003, the Federal Government adopted the National Economic Empowerment and Development Strategy (NEEDS), aimed at reducing inflation, facilitating access to credit for businesses, and creating jobs in millions. The manner of its adoption was fanciful and joyfully played with acronyms such that the state version of NEEDS, was called SEEDS, and Local Government version called LEEDS. In spite of all these policies, unemployment and inflation pressures have 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 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 undermines the role of money as a store of value, and, in addition, frustrates investment, national output, growth and the general standard of living. As a matter of fact, the negative effects of inflation on economic growth has been explored in many studies see, for example, Barro (1995), Bruno and Easterly (1995) and Gosh and Philips (1998). As an 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 serves 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 is a source of concern to policy makers and the general citizenry. A high level of unemployment implies loss of output and income. And as Layard et al (1994) put it, unemployment generally reduces output and aggregate income, causing inequality, since the unemployed lose more than the employed. According to them, unemployment not only erodes human capital but also involves psychic costs. As observed by Okun (1962), unemployment implies that not only is actual output less than potential output, it constitutes wastage of resources because goods and services that could have been produced are forgone. Unemployment therefore causes poverty, inequality, social unrest and a state of hopelessness to the unemployed. The recent youth restiveness in the Niger Delta region and the dreaded "Boko Haram" in Nigeria are pointers to this fact. Similarly, the problem of armed robbery and other social vices can also be traced to unemployment as confessions obtained from many armed robbery suspects in most cases are that they were led into the crime on account of unemployment.

The world bank has predicted that the Nigerian economy will grow at a double digit rate this year and beyond with the country's new focus on investment; and that Nigeria has 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 and 2012, respectively. Also, the country's economy is expected to grow by 7.8% this year (2014) (Ochigbo, 2011). This is 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 is 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 views inflation as anti growth, the other (the structuralists) postulates that inflation will accompany economic growth as a result of disequilibria created by structural changes which are necessary for development process (Killick, 1981:172). According to them there is always a trade-off between rising prices and growth, implying that a society which gives priority to growth must be willing to tolerate the inflation that comes with it. They also argue in favour of deliberate pursuit of inflationary credit creation as a means of accelerating growth.

In view of the theories that both inflation and unemployment, though inversely related, exist together and affect the level of economic activities, this paper has the following as its specific objectives:

(i) To determine the short-run and long-run impact of inflation and unemployment on economic activities in Nigeria.
(ii) To establish the existence or not of any causal re1ationship between inflation and unemployment in the Nigerian economy; and
(iii) To use data on Nigerian economy to test the validity of Philips and Friedman's theories of inverse correlation and long-run positive correlation between inflation and unemployment, respectively.

This paper is organized as follows, section two is a review of related literature, section 3 is the methodology and model specification, section 4 is the empirical analysis and discussion of result and section 5 is the summary, conclusions and recommendations. Discussions concerning types and causes of inflation and unemployment are not within the scope of this work as economic literature is replete with them.

SECTION 2
Review of literature

Modern macroeconomic theories on inflation and unemployment see an inverse correlation between the two as explained by the Philips (1958) curve. The notion that there exists 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 is 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 dominate, inflation and unemployment will tend to be negatively correlated, but when supply disturbances dominate, inflation and unemployment will 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 will always maintain full employment level of output and resources. This is because the demand for labour will always equal the supply of labour at the prevailing wage rate. If for any reason there was an increase in labour supply, money wages will fall and more workers would be employed. In the same way, if there is shortage of workers, money wage would rise eliminating the shortage. Thus, in the classical sense there will 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 are 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 is unemployment, output and employment will 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 combines both aggregate demand and aggregate supply by assuming Keynesian short-run view as well as classical long-run view. Here, they maintained that inflation depends on the level of potential output or natural rate of unemployment. However, the exact level of potential output and natural rate of unemployment is generally unknown and tends to change overtime.

Although much empirical research has 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 is known that any war is 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 seem 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 the existence of direct relationship between inflation and various measures of deficit financing. However, Ajayi and Awosika (1980) found that inflation in Nigeria is 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 Johanson Co-integration 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 short-run.

As demonstrated by Pondexter (1981), Delong (2002), and lyoha (2004), the consequences of unemployment are low output, low saving and investment, low income and low standard of living. In turn, Todaro (1980) views 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.

SECTION 3
METHODOLOGY AND MODEL SPECIFICATION

The methodology applied in this work is basically ordinary least squares (OLS) technique. However, recent development in empirical research was 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).

Co-integration and error-correction modeling were used to determine the existence of long-run relationships among the variables in the models. Granger (1986) causality test was conducted to ascertain

whether there is any direction of causality between inflation and unemployment.

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

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

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

Equations I and II will be estimated and their parameters tested for long-run and short-run relationships only when the variables must have 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 will be estimated and tested using the Granger causality test statistics:

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

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

where it is assumed that the stochastic error terms U_{It} and U_{2t} 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 behavior for inflation. We may distinguish any of the following four cases as demonstrated by Gujarati (2009).

(i) UNIDIRECTIONAL CAUSALITY FROM INFR to UNEM is indicated if the estimated coefficients of the lagged INFR in equation III is statistically different from zero (*ie,* $a_1 \neq 0$) and the set of estimated coefficient on the lagged UNEM in equation IV is not statistically different from zero (ie, $pi = 0$).

(ii) UNDIRECTIONAL CAUSALITY FROM UNEM to INFR is indicated if the set of lagged INFR coefficient in equation III is not statistically different from zero, that is, $a_1 = 0$ and the set of lagged UNEM in equation IV is statistically different from zero, that is, $\delta \neq 0$.

(iii) FEEDBACK or BILATERAL CAUSALITY is indicated when the coefficients of UNEM and INFR are statistically different from zero in both regressions.

(iv) INDEPENDENCE is indicated when the sets of UNEM and INFR coefficients are not statistically significant in both regression.

For the test statistic, we apply the F-test given by

$$F = \frac{RSS_R - RSS_{UR/m}}{RSS_{RSS/n-k}}$$

This statistic follows the F distribution with m and (n-k) degrees of freedom.

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

SECTION 4: ANALYSIS OF EMPIRICAL RESULTS

4.1 Unit Root Tests

The empirical results indicate that the unit root tests conducted on the variables, namely, Unemployment, Inflation and Gross Domestic Product are all integrated of order two, 1(2). In other words, they exhibit random walk characteristics and became stationary after second differencing. When variables are not stationary in their level forms, they can be made stationary by using their differences. However, as demonstrated by Gujarati (1995), “solving non-stationarity problems through differencing of data may lose valuable information about the long-run relationships between the variables that are 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 long-run equilibrium relationship among the variables using Johanson and Julius (1990) Maximum Likelihood Ratio to test for their co-integration. The theory of co-integration, as propounded by Granger (1981 and 1986), Hendry (1986), Pagan and Wickens (1989) and Mills (1990) provides a nexus or connection between integrated processes and the notion of long-run equilibrium. Basically, the idea of co-integration rests on the thesis that even though two time series may not themselves be stationary, a linear combination of the two non-stationary time series may be stationary. The likelihood ratios indicate that the three variables are stationary at both 1% and 5% significance levels. This implies that even though the variables are non-stationary at their levels, estimates arising from their OLS regression equation can no longer be spurious.

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

As is shown in the long-run model;

$$InGDP = 1.205365 - 2.080773 InUNE - 0.452835 InINF \quad \text{- - - - - - - - - - - - -} \quad v$$

$$Se = (0.990680) \quad (0.798477) \quad (0.113164)$$

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

$$\overline{R^2} = 0.203681 \qquad F = 83.83553 \qquad D-W = 1-350222$$

The coefficient of determination which shows the predictive power of the model with a value of 0.563681 implies that the model explains about 56.4% of the variability in Nigeria's economic growth performance. This is intuitively high on the realization that there are other important factors that determine the gross domestic product of a nation which have been deliberately excluded from the model. Both unemployment and inflation variables appear with negative signs, showing inverse relationship with Gross Domestic Product. However, the negative sign of the inflation coefficient does not conform with the structuralist's 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) is that inflation redistributes 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, support the view that the two variables are highly significant in the determination of Nigeria's economic growth performance. The F-value of 83.83553 at the relevant degrees of freedom show that the joint influence of unemployment and inflation factors are highly significant in the determination of Nigeria's Gross Domestic Product. Finally, the Durbin-Watson value of 1.350222 which is a measure of the existence or not of autocorrelation shows the existence of positive autocorrelation in the model. The implication is the continuous upward trend in the two economic and social problems of unemployment and inflation in Nigeria.
The short-run regression results, or the differenced model is as shown:

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

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

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

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

$$D-W = 3.008274$$

In the short-run both unemployment and inflation are inversely related to Gross Domestic Product (GDP) and are significant at 5% levels, since the computed t-values of -3.641017 and -2.493266 for unemployment and inflation rates, respectively, are greater than the tabular value of 2.060 at 5% level of significance. In the short-run, both unemployment and inflation account for about 55.7% of variations in Nigeria's Gross Domestic Product. By differencing a model, we do not have the estimate of the constant term, which have some economic implications that are rather severe. Estimating a regression equation in differenced form tells us whether the dependent variable, in this case, GDP, is going up or down but does not tell us what its level actually is because we do not have information about the intercept term. The Durbin Watson value of 3.008962 is an indicator of the existence of negative autocorrelation in the model.

4.2 Granger Causality Test

Granger (1969) causality tests are used to examine whether any cause and effect relationship exist between two or more variables, in this case, 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	PROBLEM
INF does not Granger cause UNE	28	3.97556	0.03289
UNE does not Granger cause INF		0.14754	0.86364

The results of the Granger causality tests show that at the relevant degrees of freedom, the null hypothesis that inflation does not Granger cause unemployment is rejected at 5% level of significance. The conclusion therefore is that causality runs from inflation to unemployment and not vice versa.

Finally is the test of the validity of Philips (1958) short-run inverse correlation and Friedman's (1977) long-run positive correlation between inflation and unemployment, respectively. The short-run and long-run models from Nigerian data on unemployment and inflation are as shown below:

SHORTRUN MODEL:

INF_t = -17.81533 UNE - vii

Se = (2.897810)
t = (-6.147862)
$\bar{R}^2$ = 0.211046, D-W = 0.072121

LONGRUN MODEL:

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

The short-run model shows that inflation and unemployment are inversely related to each other, while the long-run model indicates a positive relationship between the two variables. The two models are in conformity each with Philips short-run and Friedman's longrun hypotheses.

SECTION 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

This study examined the relative impact of inflation and unemployment on Nigerian economy, for the sample period 1980-2012. It specifically aimed at determining the short-run and long-run impacts of inflation and unemployment on economic activities in Nigeria, the existence or not of any causal relationship between inflation on Nigerian economy tested the validity of Philip's and Friedman's theories concerning the relationship between unemployment and inflation.

In view of the above objectives, both inflation and unemployment exhibit inverse relationships both in the short-run and long-run with Gross Domestic Product which proxies the level of economic activities and standard of living. The two variables exert highly significant influence on the economic performance of Nigeria both in the short and long-run.

The Granger causality test revealed that causal relationship runs from inflation to unemployment. The implication is that policy measures as a matter of priority be directed towards reducing inflation which will in turn exert a multiplier influence on unemployment.

Finally, a comparison between the short-run and long-run models of the ordinary least square regression (OLS) between inflation and unemployment shows that in the short-run inflation and unemployment shows that in the short-run inflation and unemployment are inversely related, while in the long-run they are directly related. This result is in conformity with Friedman's (1977) theory of short-run inverse relationship and long-run direct relationship.

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 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.

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