Do Unemployment and Inflation Substantially Affect Economic Growth?

Bello Malam Sa'idu[1] & Auwal Abubakar Muhammad[2]

Abstract

Unemployment and inflation are persistently complex and alarming problems to every economy. These twin macroeconomic variables are significant in influencing economic growth especially in developing economies. Thus, the aim of this study is to examine how unemployment and inflation substantially affect economic growth. To achieve this, three models were thoroughly subjected to quantitative analysis, namely; Ordinary Least Square (OLS) method, Augmented Dickey-Fuller (ADF) technique and Granger causality test. The result of the regression revealed that the coefficient of inflation is positive and statistically significant while unemployment is positive but has no significant effect on economic growth. This proves that inflation substantially affect economic growth, although unemployment has little substantial effect on it. Moreover, result of the unit root indicates that all the variables in the model are stationary whereas, the result of causality test suggests that unemployment does not granger causes economic growth and inflation, but economic growth and inflation Granger cause unemployment, also there exist Granger causality between economic growth and inflation. Therefore, the result suggests a one-way causation flowing from inflation to GDP. Consequently, the major policy implication of these results is that concerted efforts should be made by policy makers towards restructuring the economy, managing price instability and improving infrastructure.

Keywords: Unemployment, Inflation, Economic Growth, Diversification, Granger causality

JEL Classification Codes: C22, E24, E31, F41, O5

1. Introduction

Three ultimate macroeconomic goals which every government strives to achieve in order to ensure sound macroeconomic policy are maintenance of relative stability in domestic prices, attainment of a high rate of employment or full employment and achievement of a high rapid and sustainable economic growth. The major problems facing Nigerian economy today are unemployment and inflation. These problems are persistently complex and causes economic and social dilemma to the economy as a whole. The inability of government to provide a lasting solution to these twin challenges has contributed to a serious problem on the economic life, political system and the entire society. Thus, international statistics portray that industrial and service workers living in developing regions of the World account for about two third of the unemployed (Patterson *et al*, 2006). Moreover, Friedman (1977) argued that inflation uncertainties affect both the inter-temporal (through its effect on interest rate) and intra-temporal (through its effect on relative prices in the presence of nominal rigidities) allocation of resources. In addition, Nwaobi (2009) posited that unemployment could lead to high social vices among youth such as prostitution and armed robbery which have a serious effect on the performance of the economy. Some economists and scholars carried out deep researches on the relationship of macroeconomic variables from different perspectives.

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[1] Department of Economics & Development Studies, Federal University Dutse, Jigawa State, Nigeria.
Email: bellomalamali@gmail.com
[2] Department of Economics, Modibbo Adama University of Technology, Yola, Nigeria

A research by Chang-shuai and Zi-juan (2012) revealed a long term stable equilibrium relationship among Chinese unemployment rate, economic growth and inflation. However, in the short term, economic growth is positively correlated with unemployment rate. Again, unemployment and inflation are inversely correlated with economic growth. In another study, Adawo, *et al* (2012) found that labour force grows at more or less a steady rate of 0.3% annually while GDP growth rate at 1984 factor cost grows at 3.5% over a period of 33 years. Given these statistics, Adawo, *et al* (2012) concluded that Nigeria experienced a jobless growth in the economy and the major causes of unemployment are poor infrastructure, insecurity, poor educational system and none diversification of the economy. Similarly, Umoru and Anyiwe (2013) examined the dynamics of inflation and unemployment using the vector error correction (VEC) method over a period of twenty seven years and found that the relationship between inflation and unemployment is positive and that stagflation do exist in the economy. In another study, Constantinos and Persefoni (2009) analyzed unemployment among 20 countries and found relevance to neoclassical, Keynesian and radical/Marxian approaches. Specifically, their study dwelled on only one variable which is unemployment, but their work is unique in the sense that they were able to study 20 countries of OECD and applied a dynamic panel data analysis. Also, Bruno and Ken (2011) examined the cause of unemployment in OECD countries during the recent recession.

In a different study, Thomas (2012) applied the Phillips curve to real World phenomena and found a distinction between formation of inflation expectation and incorporation of inflation expectations. Also, the work discussed the two macroeconomic variables: inflation and unemployment, and concluded that Phillips curve is an essential part of macroeconomic policy analysis for both developed and developing nations. Even though, contribution to the literature on these three macroeconomic variables unemployment, inflation and economic growth–Nexus are enormous as highlighted above, more effort is still needed to re-examine how unemployment and inflation substantially affect economic growth. Also, most studies conducted show no consensus or clear elaboration in relation to whether unemployment and inflation substantially affect economic growth, hence the need of a research of this nature. However, despite numerous studies conducted on unemployment (e.g. Bruno and Ken, 2011; Constantinos and Persefoni, 2009), unemployment and inflation (e.g. Phillips, 1958; Tobin, 1972), Unemployment, inflation and growth (e.g. Chang-Shuai and Zi-juan, 2012), none has been found in the literature that really expounded and explained how unemployment and inflation substantially affect economic growth. Therefore, these concluded researches have opened spaces for practical, empirical and methodological research gaps that warrant further research.

2. Literature Review

The work popularly known as 'the Phillips curve' was originated by Sir A. W. Phillips in 1958. Historically, Phillips (1958) plotted 95 years UK data on wage inflation against unemployment. He discovered a short run trade-off between unemployment and inflation. Therefore, he posited the theory that, falling unemployment might cause rising inflation and a fall in inflation might be possible by allowing unemployment to rise. If government wants to reduce unemployment rate, it could increase aggregate demand, although this might temporarily increase employment, it could also have inflationary implications in labour and the product markets. In reality, Phillips hypothesized that the lower the unemployment rate, the tighter the labor market and the faster firms raise wages to attract scarce labour. At higher rates of unemployment, the pressure abated. The Phillips curve represents the average relationship between unemployment and wage behavior over the business cycle. It illustrated the rate of wage inflation that would result if a particular level of unemployment persisted for some time. After Phillips' work, economists studied the Phillips curve; some validated it while others refuted it. Thus, Friedman (1977) contended that there is no trade-off 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. He argued that, there is a natural rate of unemployment where the real wage rate is in long run equilibrium for employment rate to be below the natural rate, employers and potential employees must be willing to be hired. An employer will engage more employees only if there is an actual decrease in the real wage rate, whereas potential employees, will accept work only if there is an actual or perceived increase in the real wage rate. Hence, any unemployment rate below the natural rate must, in the long run, be a disequilibrium rate. According to Friedman (1977) workers are not likely to suffer from money illusion, as they will not ignore what happens to their real pay in the long run.

An initial higher wage will force employers to raise prices in order to afford paying the higher wages, this will still lead to a higher wage demand, which in turn leads to higher prices. Therefore, there is no end to the wage price spiral at any rate of unemployment below the natural rate.

From the theoretical perspective, Fisher (1911) opined that any change in the quantity of money produces an exactly direct and proportional change in the price level. The quantity theory of money or equation of exchange was originated by the famous economist, Irving Fisher. However, Keynes (1936) strongly argued that, a change in the quantity of money may or may not affect prices. Actually, the changes in supply of money and prices are seen via their impact on the rate of interest, level of investment, output, employment and income. In fact, Keynes' theory provides causal mechanism by which a change in quantity of money influences interest rate, and interest rate induces investment while investment leads to a multiplier effect on income, output and employment. The multiplier effect may lead to a change in cost of production which in turn affects the price level. However, the neo-Keynesian theoretical exposition combines both aggregate demand and aggregate supply. The neo-Keynesian school assumed a Keynesian doctrine on the short-run and a classical view in the long-run. The simplistic approach is to consider changes in public expenditures or the nominal money supply and assumes that expected inflation is Zero. However, aggregate demand increases with real money balances and decreases with the price level. The neo-Keynesian theory focuses on productivity, because declining productivity signals diminishing returns to scale and induces inflationary pressures, resulting mainly from over-heating of the economy and widening output gap. Moreover, Umo (2007) opined that when total demand increases more than the increase in the existing supply of output, demand pull inflation occurs. It is the stepped-up general demand which is pulling the general price level upwards. Besides, demand pull inflation is the excessive aggregate demand facilitated by excess supply of money. Fiscal and monetary policies are eminently suitable for dealing with this type of inflation. He identifies the following policies that directly or indirectly deal with cost push inflation which includes; enhancing the efficiency and social responsibility of big businesses and trade unions, wage price control, and indexing policy.

Interestingly, Yesufu (2000) discovered that a new and profound cause of unemployment also derives from attempt to manage the economy with policy instruments that are irrelevant, ill advised and far in advance of the stage of development. Curiously, these policy instruments are fashioned and insisted upon by some international organizations notably the International Monetary Fund (IMF) and the World Bank (IBRD). Similarly, Lawanson (2007) noted that economic recession has significant negative impact on the utilization of the country's human resources, leading to high level of unemployment resulting into joblessness by many university graduates. He further identifies the problem to be two fold; the increasing decline in quality of education and training and the inability of the government to adequately finance educational system. This has led to deteriorating infrastructure and discouraging personal emoluments for teachers. Thus, despite various government policies and programmes aimed at reducing unemployment among youths and adults, the problem remains unabated. He concluded that, unemployment has been found to reduce national wealth, increases crime and socio–political violence. The growing incidence of absolute and relative poverty in the country is attributed to the worsening unemployment situation.

Empirically, Chang and Zi-juan (2012) examined a long run and a short run relationship between unemployment rate, economic growth and inflation and found that there is a long term stable equilibrium relationship among the variables. In the short term, economic growth is positively correlated with unemployment rate, while inflation and unemployment are inversely correlated. Also, Umaru and Zubairu (2012b) studied the effect of inflation on economic growth and concluded that GDP Granger cause inflation and inflation does not Granger cause GDP. This implies that, it is the output of the economy that influences a rise in the price level and not the price level causing increase in output. Moreover, inflation has a negative impact on unemployment and the causality test shows that there is no causation between unemployment and inflation. Also, the ARCH and GARCH revealed that the data exhibit a high volatility clustering. Furthermore, Umoru and Anyiwe (2013) examined the dynamics of inflation and unemployment over a period of twenty seven years and discovered that the relationship between inflation and unemployment is positive and there exist stagflation in the economy. Therefore, they suggested interest rate reduction and control of money supply to boost economic growth. In another empirical work, Taiwo (2011) examined the impact of investment and inflation on economic growth and concluded that there exit a negative relationship between inflation and real GDP. He recommends supply-side and demand management policies to reduce inflation both in the short and long run.

Similarly, Adawo, *et al* (2012) found that labour force grows at more or less a steady rate of 0.3% annually while GDP growth rate at 1984 factor cost grows at 3.5% over a period of 33 years.

Thus, they concluded that Nigeria experienced a jobless growth in the economy and the major causes of unemployment are; poor infrastructure, insecurity, poor educational system and none diversification of the economy. Therefore, they recommend that government at all levels should partner with the private sector and diversify the economy in order to create jobs for the youth. In addition, Fatukasi (2011) investigated the determinant of inflation in Nigeria and discovered that all the explanatory variables, viz; fiscal deficit, money supply, interest and exchange rate have positive impact on inflation. He concluded that inflation is an important macroeconomic variable that requires full knowledge at any point in time for its menace to be properly tackled in the country. Furthermore, Thomas (2012) examined the theory of Phillips curve while focusing on the distinction between formation of inflation expectation and incorporation of inflation expectations. His findings revealed that Phillips curve focused largely on formation of inflation expectations. Besides, Engelbert and Simon (2012) studied the impact of monetary policy on unemployment hysteresis which revealed that unemployment hysteresis that occurs in a period of recessions depends on monetary policy reactions. Also, Bruno and Ken (2011) studied the course of unemployment in OECD countries during the recent recession. Their findings revealed that the recent recession had different effect on OECD countries. However, those countries with stricter employment legislation experienced smaller increase in unemployment than those with loose employment protection. *Ceteris paribus*, those countries with higher collective bargaining coverage tend to experience lower unemployment increase than those countries with loose collective bargaining mechanism which tends to have higher unemployment rate.

3. Methodology and Data

The data used for this study are basically time series data, secondary in nature, ranging from 1986-2010. Therefore, data were sourced from Central Bank of Nigeria's (CBN) Statistical bulletin which includes; data on real gross domestic production (RGDP) which is a proxy for economic growth, consumer price index (CPI) proxy for inflation and unemployment rate (UNEP). The ordinary least square method of econometric approach was used in estimation.

3.1 Model Specification

The traditional Cobb-Douglas production function was employed. The model can be specified as follows:

$$RGDP = \beta_0 \, inf^{\alpha 1} \, unep^{\alpha 2} \qquad\qquad\qquad (i)$$

After imposing logarithmic conversion on equation (i) we further obtain structural forms of production function equations (ii) and (iii). Thus, the models can be specified as:

$$RGDP = \beta_0 + \beta_1 \, inf + \beta_2 \, unep + e_t \qquad\qquad (ii)$$
$$Log \, RGDP = \beta_0 + \beta_1 \, log \, inf + \beta_2 \, log \, unep + e_t \qquad\qquad (iii)$$

Again, the models were later specified in matrix form as:

$$
\begin{array}{ccc}
AX & = & B
\end{array}
$$

$$
\begin{bmatrix} inf & unep \\ log\,Inf & log\,unep \end{bmatrix}
\begin{bmatrix} \beta 1 \\ \beta 2 \end{bmatrix}
=
\begin{bmatrix} RGDP \\ Log\,RGDP \end{bmatrix}
\qquad\qquad (iv)
$$

Where; *Rgdp* is Real Gross Domestic Product, *Inf* is defined as Inflation rate, *Unep* is unemployment rate, whereas; β_0, β_1, β_2 are parameters and *et* is the error term in the model. Thus, model 1, shows the relationship between economic performance, (RGDP), inflation and unemployment rate. The *apriori* expectation is that, β_0, β_1, *and* $\beta_2 > 0$.

4. Results and Discussions

In the Appendix, Table 1, contains regression result of the model specified above. The result indicates that the null hypothesis is rejected going by the rule of thumb, when t-calculated is greater or equals to t-tabulated then, the null hypothesis is rejected.

In line with the above statement the null hypothesis reveals that (β_1, $\beta_2 > 0$) which implies that β_1 is statistically insignificant. Thus, Unemployment insignificantly affect economic growth because the t-statistics is less than 2 (i.e. 0.26) on a probability value of (0.799%). On the other hand, inflation has a significant effect on economic growth since the t-statistics is greater than 2 (i.e. 3.46) and the null hypothesis is rejected at 1% level of significance. Furthermore, the F- statistics is 7.27 which show the joint significance of the explanatory variables, thus, it is found to be statistically significant at 1% level of significance.

The R-square of 0.40 illustrates that 40% variation in economic growth is explained by unemployment and inflation. Also, the adjusted R-square with a value of 0.34 which shows 34% variation in dependent variable is explained by the independent variable when the degree of freedom is taken care off. The Durbin-Watson statistics of 2.37 signifies that there is no autocorrelation and the model is not spurious. Also, the unit root test became important to make the data to be stationary. The results of the unit root test are contained in Table 2 and 4. The result revealed that all the variables in the model are stationary at all level of significance; 1%, 5%, and 10% for economic growth and at first difference (d(1)) for unemployment and inflation, which is indicated by the ADF results at all levels less than the critical values in negative direction. The null hypothesis is rejected at 1% significance level. The results of the Granger causality are contained in Table 5, in the Appendix. The results revealed that unemployment does not Granger cause economic growth and inflation, but economic growth and inflation can Granger cause unemployment, and there exists a Granger causality between economic growth and inflation, since the F-statistics values for inflation and economic growth is greater than 2 which indicates the rejection of the hypothesis that there is a causation between inflation and economic growth. This confirms that inflation substantially affects economic growth while unemployment has little substantial effect. Thus, our findings are similar to Chang-Shuai and Zi-juan (2012) that related inflation and unemployment with growth and to some extent Umaru and Zubairu (2012) study that linked unemployment and inflation. Therefore, the two papers are consistent in affirming the relationship between inflation, unemployment and economic growth. On the other hand, Adewo, *et al* (2012) work is dissimilar to this, though theirs dwelled on unemployment in Nigeria.

5. Conclusion and Policy Recommendations

The findings revealed that the coefficient of inflation is positive and statistically significant while unemployment is positive but has no significant effect on economic growth. Thus, inflation substantially affects economic growth, while unemployment has little substantial effect on it. Also, unit root indicates that all the variables in the model are stationary. Causality test suggests that unemployment does not granger causes economic growth and inflation, but economic growth and inflation Granger cause unemployment. Besides, there exist Granger causality between economic growth and inflation which implies a one-way causation flowing from inflation to GDP. The twin macroeconomic variables, unemployment and inflation are the major problems confronting the economy which have the propensity to influence other economic and social factors. The inability of government to find a lasting solution to these problems has affected the economic life, economic activities and political system of the country as a whole. Therefore, this paper investigates empirically how unemployment and inflation substantially affect economic growth. The results of the unit root revealed that all variables in the model are stationary and the causality test suggests that unemployment does not granger cause economic growth and inflation. However, economic growth and inflation does not Granger cause unemployment, and there exists Granger causality between economic growth and inflation. The results indicate a one-way causation flowing from inflation to GDP. This confirms that inflation substantially affect economic growth whereas unemployment has little substantial effect on economic growth (i.e. F-stat value 1.56 is closer to 2). Thus, there is a need for strong institutional collaboration and link among ministries for dealing with these triplet macroeconomic variables; unemployment, inflation and economic growth in the country. Consequently, this paper suggests some policy options for the government as follows: (1) restructuring the economy through inward growth not along foreign borrowed ideology; (2) efficient modern technology to create more sustainable jobs and enhance the real wage of workers; (3) ensure macroeconomic management of price instability; and (4) improving infrastructure particularly electricity which in turn may generate employment. Finally, future research should focus on panel data and application of VAR models to study the long-run dynamic nature of these variables.

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Appendix

Table 1: Ordinary Least Squares (OLS)

Dependent Variable: RGGDP
Method: Least Squares
Date: 02/02/14   Time: 12:13
Sample: 1986 2010
Included observations: 25

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.826476	11.58846	0.761661	0.4544
UNEMPLO	0.206127	0.799199	0.257917	0.7989
INFLA	0.843868	0.243965	3.458974	0.0022
R-squared	0.397775	Mean dependent var		29.70800
Adjusted R-squared	0.343027	S.D. dependent var		26.44348
S.E. of regression	21.43345	Akaike info criterion		9.079950
Sum squared resid	10106.64	Schwarz criterion		9.226215
Log likelihood	-110.4994	Hannan-Quinn criter.		9.120517
F-statistic	7.265604	Durbin-Watson stat		2.369192
Prob(F-statistic)	0.003779			

Appendix Continued:

Table 2: Unit Root (RGGDP)

Null Hypothesis: RGGDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.350603	0.0024
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Table 3: Unit root (INFLA)

Null Hypothesis: D(INFLA) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, maxlag=2)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.803764	0.0001
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

*MacKinnon (1996) one-sided p-values.

Table 4: Unit root (UNEMPLO)

Null Hypothesis: D(UNEMPLO) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.930789	0.0001
Test critical values:	1% level	-3.752946	
	5% level	-2.998064	
	10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

Table 5: Granger Causality Tests

Pairwise Granger Causality Tests
Date: 02/02/14   Time: 12:14
Sample: 1986 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
RGGDP does not Granger Cause INFLA	23	0.06972	0.9329
INFLA does not Granger Cause RGGDP		3.74488	0.0437
UNEMPLO does not Granger Cause INFLA	23	1.77663	0.1976
INFLA does not Granger Cause UNEMPLO		1.04175	0.3732
UNEMPLO does not Granger Cause RGGDP	23	1.55849	0.2376
RGGDP does not Granger Cause UNEMPLO		1.42739	0.2658