

# **An Examination of the Impact of Unemployment and Inflation on the Nigerian Economy: A *Bounds Testing Approach***

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**Abstract:** Despite countervailing views and propaganda from government sponsored media agencies, there is a preponderance of evidence that the Nigerian economy is challenged on all fronts by the daily geometric increase in her unemployment figures, hence this study is undertaken to examine the impact of unemployment and inflation on the Nigerian economy between 1981 to 2015. The study adopted an Autoregressive Distributed Lag (ARDL) approach and other econometric tools of analysis to answer the objectives set out in the study. The Augmented Dickey-Fuller, Phillip-Perron Unit Root Test and Bounds Test method of cointegration employed indicates that the series used in the model are all stationary with a unique long run relationship established among the variables. Major findings revealed that unemployment has an insignificant impact on economic growth. The study also established an inverse relationship between inflation and economic growth within the period under reference. Based on the foregoing, the following recommendations among others were made: First, in a bid to control the naira exchange rate since it does have bearing on inflation, the government should put in place an enduring framework to buffet the risk of the domestic producers for them to take innovative roles of developing and manufacturing products that will have competitive advantage in the international markets. This is critical to the realization of a stable inflation rate and self-reliance for Nigeria. Secondly government should revitalize the various ailing industries and establish new ones to encourage massive industrialization. This strategy will create massive jobs for the teeming graduates and reduce the frightening unemployment figures confronting Nigeria.

**Keywords:** Unemployment, Inflation, Economic Growth, ARDL

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## **1. Introduction**

Unemployment and inflation is a serious problem in almost all countries of the world both in industrially advanced as well as poor countries. During the period of recession, an economy usually experiences a relatively high unemployment rate. High unemployment signals a deficiency in the labour market, deepening poverty and spread indecent standard of living (World Bank 1994). Nigeria being part of the global community has its own share of the problem of unemployment as the canker- worm has been on a steady rise in the recent past.

The International Labour Organization (ILO) [1] defines unemployment as a situation of being out of work or of needing a job and continuously searching for it in the last

four weeks, or of someone unemployed (age 16 or above) but available to join the work force in the next two weeks. Unemployment rate (Nigerian version) is the proportion of those who are looking for work but could not find work for at least 40 hours during the reference period to the total currently active (labour force) population. The category of people considered not in the labour force include those without work, who are not seeking for work and/or are not available for work as well as those below the working age. Examples of these are full time housewives, under-aged children, physically challenged and incapacitated persons and such others not employable.

Indeed, the Nigeria economy is at present facing her most

severe and life-threatening economic challenges since the end of the Nigerian-Biafra civil war of the seventies. In other words, as the biggest recession in the country's history continues to bite harder day by day, income levels of families have been adversely threatened and its attendant negative implications for the nation's economy now appears to be incontestable. This economic hurricane started as a result of shocks in the international oil market which led to significant slowdowns in the economic activity of many developed and Asian nations, hence the drastic cut in revenue to the Nigerian government. As it stands today, more slow-down in economic activity is expected from countries like the United States because of glaring uncertainties occasioned by the 2016 presidential election in that country. If these uncertainties persist and there were to be significant slowdowns in the economic activity of the United States of America, they will be buying less crude oil; and if they buy less crude oil, crude oil prices will crash and consequently, the Nigerian budget will collapse. Right now, the country appears stuck with the various off shoots of crisis (such as shrinking private inflows, weakening naira, nose-diving foreign reserves, reduced revenue due to plummeting oil prices, low crude oil production consequent of the prolonged unrest and militancy in the Delta region of Nigeria, and alarming hyperinflation). The unchecked, unchallenged and overzealous activities of herdsmen and other terrorists organizations across the federation are a clear signal that Nigeria is on a precipice politically and economically.

Specifically, Nigeria is currently experiencing a staggering rate of inflation, well up into the double digits. At the same time, contrary to all economic theory, she is experiencing a severe recession, as the unemployment rate has risen above single digit and the gross national product has steadily declined which are symptoms of a recession that might well sink into a full-scale depression if the country is yet to be officially declared as such. Thus, this double bird of rampant inflation and recession can be professionally regarded as stagflation or slumpflation. Just as the great depression was a worldwide phenomenon, so the current rampant inflation is devastating all the states of the federation sparing not even the commercial nerve centre, Lagos. Therefore, economists have diagnosed the current inflationary trend as both "demand-pull" inflation in which consumer demand far exceeds the supply of goods and services (that is, too much money pursuing too few goods) and as "cost push" inflation in which rising costs of labor push prices even higher. Another school of thought hold the view that the inflation currently being faced is an "imported-inflation" due to foreign exchange shortages which have greatly pushed prices of goods up. However, the general consensus is that both of these forces are now at work, reinforcing each other in an ever upward spiral of prices. Underlying these inflationary pressures are decidedly new features of the world economy, such as the energy crisis and the general scarcity of essential resources and low growth that has occasioned an alarming rate of unemployment of factors of production hence the uncontrollable influx of able-bodied workers into the

unemployment market. The consensus of most scholars, therefore, is that the current inflation (with or without recession) is a long-range phenomenon not likely to recede in the near future [2].

More recently, the International Labor Organization (ILO) [3] reported that global job losses worldwide could hit seventy-one million by the end of 2015 as a result of the economic slowdown believed to be degenerating into a global unemployment crisis. Under the present economic downturn that is currently ravaging the world, ILO reported that 2015 would finish with more unemployed peoples than at the end of 2013 during which the global unemployment rate was single digit.

#### *Problem Statement*

The challenge posed by unsustainable inflationary figures in Nigeria is becoming alarming. Their ravaging effects are almost wiping out the middle class, as one no longer sees a clear difference between the haves and have not. Both the rich and the poor have become victims of this hydra-headed phenomenon call inflation. Thus, the political and security implications are daunting. Here, the International Labour Organisation prediction is that the crisis could also push another two hundred million workers into extreme poverty as they are faced with the grim reality of being forced out of a living in informal, underpaid and unstable work situation (such as in South Asia and Africa). Beyond the fifty-one million people that will be directly affected by the global job losses, a number of people that depend on them will also be affected indirectly. For example, an average worker has about five dependants and those in the Diasporas who normally remit money home will be equally affected. It could also lead to high crime rate and prostitution by young females in addition to increasing the rate of drug trafficking as well as money laundering.

Furthermore, it would encourage indiscipline from children of parents that are directly affected, as standards of living will also fall since those affected can no longer pay for the things of interest. Consequently, governments have to do something urgent to ameliorate the situation as the situation at hand is not a child's play. And whether the above apocalyptic events will ever come to pass, it is clear that rampant inflation now joined by a dangerous recession has already had a dramatic impact on the way of life of many Nigerians. Despite the plethora of studies on the subject matter of inflation and unemployment in both developed and developing countries, the literature on inflation and unemployment in Nigeria deserves a fresh examination in the light of emerging realities, hence this study seeks to empirically examine the impact of unemployment and inflation on economic growth in Nigeria. The remaining part of the paper is broadly divided into four sections. Following this introduction, section two features on literature review and theoretical framework, section three dwells on methodology of the study. The results and discussions are in section four. Section five summarizes and concludes the paper with policy recommendation.

## 2. Literature Review

### 2.1. The Concept of Inflation and Unemployment

The concept of inflation has been define as a persistence rise in the general price level of broad spectrum of goods and services in a country over a long period of time. It is measured as the rate of increase in the general price level over a specific period of time [4]. Inflation has been intrinsically linked to money, as captured by the often heard maxim inflation is too much money chasing too few goods. According to [5], inflation has been widely described as an economic situation when the increase in money supply is faster than the production of goods and services in the same economy. Unemployment on the other hand is defined by the International Labour Organization (ILO) as numbers of the economically active population who are without work but available for and seeking work, including people who have lost their jobs and those who have voluntarily left work [6]. Though there seems to be convergence on this concept, its applications have been bedeviled with series of problems across nations.

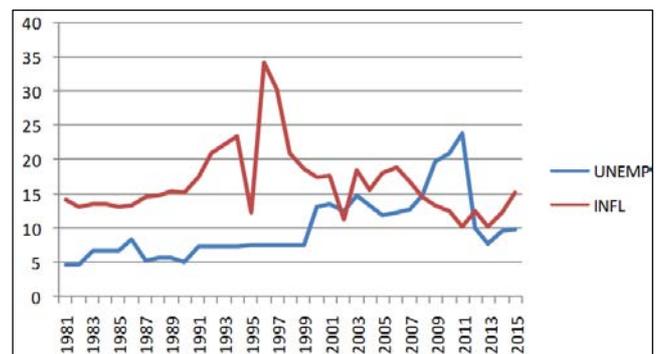
In most countries, particularly Nigeria, people below the age of 15 years and those above the age of 55, who are actively engaged in economic activities, are usually excluded from labour statistical surveys. All these factors have the tendency to result in underestimation of unemployment thereby making international comparison very difficult. Factors such as the preponderance of full housewives (but who are willing to be engaged in paid job) and unpaid family workers also contribute significantly to the underestimation of unemployment. Frictional unemployment may be regarded as subset of structural unemployment, mainly reflecting temporary unemployment spells as a result of job search and matching difficulties in connection with quits, new entries to the labour market, and job separation because of employers' dissatisfaction with the individual workers [7]. Ordinarily, this kind of unemployment does not usually pose much threat to individual's welfare, as it is temporary in nature. However, the situation in Nigeria is that of frictional unemployment growing into a long-term unemployment and thereby resulting into a stable state of unemployment [8].

### 2.2. The Trend of Inflation and Unemployment Growth in Nigeria

When Nigeria gained political independence in 1960, the need for rapid growth and development became pertinent. Consequently, a number of investments activities both within and outside the country were embarked upon. But the investment activities that characterized the period from independence until now show more in demand pressure than in expansion of output. Thus, the developmental efforts have been consistently accompanied by inflationary trend. Up till 1968, the rate of inflation in Nigeria was relatively low, the historical average rate being about 5.10 percent. The rising prices became a concern for the then military government when in 1969, the inflation rate hit double digit of 10.36

percent. In reaction to this phenomenon, the government in December 1969 imposed a wage freeze and price control measures. Nevertheless, the inflationary pressure however continued unabated [11]. The double digits inflation rate continued till 1981.

The effort of government at importation and distribution of essential commodities coupled with the Green Revolution Campaign during 1981 brought down the rate of inflation to 7.7 percent in 1982. The respite for this slow down was short lived. In 1983, the inflation rate went up to 23.2 percent reaching a high rate of 39.6 percent in 1984. This trend was abated in 1986 through 1987 when the rate was brought down to a low rate of 5.4 percent and 10.2 percent respectively. The rate picked up rapidly again in 1988 and 1989 reaching on all time high rate of 38.3 percent and 50.5 percent respectively. But as a result of output growth in the stable food subsection, the inflationary rate was brought down to a very low rate of 7.4 percent in 1990. Since 1991, the trajectory of domestic prices has been upward with inflationary rates of 44.6 percent, 57.2 percent and 57.0 percent recorded for 1992, 1993 and 1994 respectively.



Source: Author's computation using Microsoft 2007

**Figure 1.** Trend of Inflation and Unemployment Growth in Nigeria (1981 – 2015).

This trend continued till 2003 when rate of inflation fell to 11.6 percent in 2004 and 10.0 percent in 2005. The inflationary rate declined to single digit rate of 8.5 percent in 2006. The single digit inflation recorded during 2006 was attributed to several factors including the clement weather experienced during the year, the appreciation and relative instability of naira exchange rate as well as the effects of sound monetary and fiscal policies. Inflation figures have remained on the upward trend since 2013 to 2015 owing majorly to wrong government fiscal policies and inconsistent shifts in monetary policy decisions by the Central Bank of Nigeria. The persistent upward trends in inflation have become a serious and contentious problem in Nigeria since independence. In reaction to this, several measures have been taken to tackle this problem through fiscal and monetary policies. This includes cut back of public spending and the use of bank financing [12].

The extensive state involvement in the economy was curtailed and investment reduced leading to large-scale economic retrenchment. Also, monetary policy was tightened

through interest rate increases and credit restrictions among other measures. These measures were the offshoot of IMF-sponsored stabilization programme adopted in 1986. Nonetheless, the little achievement of these measures led to economic decline and stagnation. Generally, it is evident from the graph below that while inflation was rising on an upward trend, unemployment trail behind except in 2007 to 2012 when the rate of unemployment grew higher than inflation rate in the country. It is noteworthy that 2007 was the period the world was hit with the global financial crises that affected most world economies including Nigeria. It was at this period that so many jobs were lost to low aggregate demand by consumers; hence many were thrown into the labour market. The upward movements of unemployment rate decline between 2011 to 2013 as these periods were considered the period of high oil revenue which resulted to modest increase in economic growth and job creation in different sectors of the economy. However, this positive trend nose-dived between 2014 and 2015 when prices of crude oil started fluctuating leading to decline in growth projections [13, 14].

The rise in the unemployment rate was largely attributed to the increased number of school graduates with no matching job opportunities, a freeze on employment in many public and private sector institutions as well as the slow disbursement of the capital budget by the Federal Government are quick means of accelerating unemployment rate in any nation. The result of the survey by International Labour Organisation (ILO) in Nigeria shows that persons aged 0 to 14 years constituted 39.6 percent, those aged between 15 and 64 (the economically active population), constituted 56.3 percent, while those aged 65 years and above constituted 4.2 percent. Before now, not a few economic watchers have queried the recorded Gross Domestic Product growth rates in Nigeria, which over time are contrary to the growing rate of unemployment. Amid this high rate of unemployment, the economic watchers have noticed that there is an increasing trend of disinterest by the emerging younger generation in highly labour-intensive sectors such as agriculture and factory work in preference for white collar jobs which have become increasingly difficult to come by, except for a privilege few, thus resulting in many preferring to remain in the labour market rather than taking up such jobs [15].

### 2.3. Empirical Review

There is huge number of studies that investigate the impact of unemployment and inflation on economic growth globally, however, empirical studies on the topic for Nigeria is scanty. Some of these studies are reviewed below.

[16] investigated inflation rate and economic growth in Nigeria between 1980 and 2013. The study made use of secondary data sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin and the National Bureau of Statistics (NBS). The Ordinary Least Square (OLS) logged multiple regression was employed with Gross Domestic Product (GDP) as the dependent variable and Inflation Rate

(INFR), Exchange Rate (EXCHR), Input of Labour and Input of Capital serving as the explanatory variables. Their results showed that inflation rate in line with a priori expectations had a positive relationship but non-significant with the economic growth rate. This suggested that as the GDP rises inflation also rises, meaning that there has been no effectiveness in the monetary policies aimed at tackling or controlling inflation rate in Nigeria.

[17] also pointed out the problem arising from the concept of labour force. In most countries, particularly Nigeria, people below the age of 15 years and those above the age of 55, who are actively engaged in economic activities, are usually excluded from labour statistical surveys. All these factors have the tendency to result in underestimation of unemployment thereby making international comparison very difficult. Factors such as the preponderance of full housewives (but who are willing to be engaged in paid job) and unpaid family workers also contribute significantly to the underestimation of unemployment.

[18] investigated the impact of inflation on economic growth of Nigeria using annual time series data between 1970 – 2013 with a tri-variate vector autoregressive (VAR) model for analysis. After checking the series for unit root, it was identified that all the variables are stationary at first difference. The cointegration test reveals the presence of longrun relationship among variables in the model. In addition, estimate of the vector error correction model indicates that there is convergence among the variables in the long run and that takes about 5 consecutive years. The dynamics of the relationship within the system suggest that there is a one-period temporary shock to consumer price level, which shows that there is a slow positive short run contemporaneous impact on the real GDP of Nigeria. However, this dissipates into a negative and permanent shock after 5-6years. This conforms to the neo-classical theory of sticky prices and short run economic disequilibrium.

[19] examined the impact of inflation rate on economic growth in Nigeria. The study explored secondary data for the period of 1960 to 2012 and used E-view 7.2 statistical software in processing and analyzing the time series data. The empirical result of the test showed that for the periods 1960-2012, there was no co-integrating relationship between inflation and economic growth for Nigeria data.

[20] studied the macroeconomic variables which cause unemployment for Turkey. Quarterly data from 2000 to 2008 is used as the sample data for the study. Augmented Dickey Fuller test (ADF), Phillip-Perron test, Johansen cointegration, and granger causality techniques were used for analysis. The results showed that there is a significant impact of real GDP, consumer price index and previous unemployment rate on the unemployment rate. Whereas real effective exchange rate has no impact on unemployment within the study period.

[21] studied the relationship between inflation and unemployment in a situation where inflation has differential outcomes on employed and unemployed workers. The data used in this analysis is from Italian Survey of household income and Wealth 2004. Only labor force was included.

General equilibrium model and linear regression method is used. The result explores that the relationship of inflation-unemployment is either negative or positive which depend on goods and labor market institutions. A higher rate of inflation increases workers' incentives to work and generates a negative effect on unemployment. On the other hand, inflation lowers a firm's return from creating job vacancies, thereby raising unemployment.

[22] investigated the relation among crime and various economic indicators and to fulfill this objective, sample data was gathered covering period from 1975 to 2007. To find out the relation among the variables, Augmented-Dickey-Fuller test, Johansen cointegration and granger causality tests were applied. Unemployment, poverty, crime, and inflation were used as variables. The result of cointegration showed long term relation among all the variables. The result of granger causality showed that in Pakistan, crime is granger caused by poverty, unemployment and inflation. They recommended that while making policies, all the variables causing crimes need to be considered and addressed by the policy makers.

[23] explored the role that inflation forecasts play in the uncertainty surroundings the estimated effects of alternative monetary rules on unemployment dynamics in Europe and United States. The data was of US and European zone covering period from 1990 to 2005. They have used the inflation forecasts of eight competing models in a standard Bayesian VAR to analyze the size and the timing of these effects, as well as to quantify the uncertainty relative to the different inflation models. The results are in line with the model-combination approach that central banks already follow when conceiving their strategy.

[24] examined inflation in USA for the period between 1960 and 2004. The data used in this paper is taken for the period of 1960 to 2004 and the variable used are inflation (consumer price index or GDP deflator), unemployment and change in labor. Phillip curve is used in this paper. The result explains that the population projections constructed by the US Census Bureau provides a useful tool to evaluate the long-term behavior of the labor force changes and the inflation and real economic growth are independent and driven by the different forces related to population.

[25] studied the relationship between inflation and unemployment in new European Union member states. The data used in this analysis is annual data covering the period from 1994 to 2005, taken from European Commission 2004 referred to as the new 10 European Union member states. The three variables used are "the price deflator of gross domestic product at market prices (national currency; annual percentage change)" and "nominal compensation per employee; total economy (national currency; annual percentage change)" and "total employment rate (%)". Non-linear least square method of estimations and E-views techniques are used. This paper concludes that the application of common policies across economy may be questionable because of the different effect of these policies on inflation and unemployment.

[26] investigated the impact of growth on unemployment

and poverty for Nigeria. The main objective of the study is to investigate the relation among growth, unemployment and poverty and to find solutions to overcome these shortcomings. For this, annual time series data of period 1970 to 2000 is studied to answer the questions. Three stage least square (3SLS) estimation was applied on the selected data. Variables selected for the study were unemployment, inflation, and index of agricultural production, index of petroleum production, money supply, exchange rate, and changes in real GDP, savings, work stoppages and trade disputes. The result showed that growth is negatively related to poverty and positively related to unemployment. They suggested that policy makers should reduce the inequality of levels of income to overcome poverty and low growth.

[27] examined whether the relationship between inflation and economic growth has a structural breakpoint effect or not for the Jordanian economy from the period between 1970 and 2003. He finds that this relation tends to be positive and significant below an inflation rate of 2-percent and the structural breakpoint effect occurs at an inflation rate equal to 2-percent. Beyond this threshold level inflation affects economic growth negatively.

[28] examined the short-run and long-run dynamics of the relationship between inflation and economic growth for four South Asian economies: Bangladesh, India, Pakistan, and Sri Lanka. Applying co-integration and error correction models to the annual data retrieved from the International Monetary Fund (IMF) International Financial Statistics (IFS), they found two motivating results. First, the relationship between inflation and economic growth is positive and statistically significant for all four countries. Second, the sensitivity of growth to changes in inflation rates is smaller than that of inflation to changes in growth rates. These results have important policy implications, that is, although moderate inflation promotes economic growth, faster economic growth absorbs into inflation by overheating the economy. Therefore, these four countries are on the turning point of inflation-economic growth relationship.

[29] investigated the relationship between inflation and economic growth in the context of Brazil which has been experiencing persistent high inflation until recently. Analyzing a bivariate time series model (i.e., vector autoregression) with annual data for the period between 1980 and 1995 and found that there exists a negative relationship between inflation and economic growth in the short-run, but inflation does not affect economic growth in the long-run. Their empirical results also support the super-neutrality concept of money in the long run. This in turn provides empirical evidence against the view that inflation affects economic growth in the long run.

[30] used the Least Trimmed Squares (LTS) method, as introduced by Rousseeuw and Leroy (1987), which detects regression outliers and produces robust regression to examine the impact of inflation on economic growth in Tanzania. The empirical results obtained suggest that inflation has been harmful to economic growth in Tanzania.

[31] conducted an empirical analysis using a small sample

of Asian countries and countries belonging to the Organization for Economic Cooperation and Development (OECD) separately. After controlling for labor and capital inputs, the estimated results suggest that for the OECD countries there exists a statistically significant negative relationship between economic growth and inflation including its first difference. However, the relationship is not statistically significant for the developing countries of Asia. The crucial finding of this empirical analysis suggests that the cross-country relationship between inflation and long-term economic growth experiences some fundamental problems like adjustment in country sample and the time period. Therefore, inconclusive relationship between inflation and economic growth can be drawn from comparing cross country time-series regressions with different regions and time periods.

#### **2.4. Theoretical Framework**

In their quest to examine the impact of unemployment and inflation on the Nigerian economy, economists have come up with diverse theories to explain the concept. However, this study restricts itself to the Search Theory of unemployment, Phillips Curve Theory and Monetarist hypothesis. These theories are deemed sufficient to explain the phenomenon of unemployment and inflation and are designed to serve as framework upon which this study is hinged.

##### **2.4.1. The Search Theory of Unemployment**

This theory was put forth by Terry (1998) who believes that workers have different skills requirements. Hence, workers need to find well-paying, desirable jobs, while firms need to find the most productive workers. According to him, neither firms nor workers have all the information they need about the options available to them, as a result, they must engage in search. Since search is costly and time consuming both firms and workers must use some of their resources to find a good match. On the part of workers, it is assumed that they only search when they are unemployed. Hence, they are faced with an uncertain environment as firm do on their part. When a worker gets a job wage offer, for instance, he / she must decide whether to accept it or continue searching for a better offer because accepting such offer means foregoing the chance of a higher wage offer later; while continuing the search means losing the wages he/she would have earned if she had accepted the offer and started working. The wage at which the worker is indifferent between continuing the search and accepting the current job is called the reservation wage, as a result the workers accept all job offers above the wage and turn down all offers below it.

Sequel to the above when a search is successful, that is, when there is a match between the needs of the workers and the firm, the worker leaves the unemployment market. Hence, the theory holds that, the wage offered by the firm is directly related to the workers' productivity, all things being equal. Suppose, that there is an economy-wide increase in productivity that workers are not aware of, then, there is the tendency that such higher productivity can make it more

attractive for the firm to increase employment by allowing it to do so by increasing the wage it offers to workers. This in turn increases the likelihood that the average worker will find an acceptable job offer and reduce the time she is likely to spend searching. Thus, the unemployment rate will decline in response to the increase in productivity. Furthermore, the search theory of unemployment is a way in which improvement in technology could have a long lasting effect on the rate of unemployment if it leads to permanent increase in the rate at which searching firms and workers find the right match. The foregoing further buttressed the study of Gomme (1998) which suggested that the internet has made this possible because firms now routinely post vacancies on the internet, so that workers can look for jobs in multiple locations at almost no cost.

##### **2.4.2. The Phillips Curve**

Two major goals of interest to economic policy makers are low inflation and low unemployment, but quite often, these goals conflict. The adoption of monetary and/or fiscal policy moves the economy along the short-run aggregate supply curve to a point of higher price level. As higher output is recorded, this is followed by lower unemployment, as firms need more workers when they produce more and vice-versa. This trade-off between inflation and unemployment is described as the Phillips curve. This was an empirical discovery by [32], which showed an inverse relationship between wage and unemployment rates, using United Kingdom data plotted over the period 1862-1957. The discovery is strengthened by the fact that movement in the money wages could be explained by the level and changes of unemployment. An argument in favour of the Phillips curve is the extension that establishes a relationship between prices and unemployment. This rests on the assumption that wages and prices move in the same direction. The strength of the Phillips curve is that it captures an economically important and statistically reliable empirical relationship between inflation and unemployment.

##### **2.4.3. The Monetarists**

The monetarists, following from the Quantity Theory of Money have propounded that the quantity of money is the main determinant of the price level, or the value of money, such that any change in the quantity of money produces an exactly direct and proportionate change in the price level. The quantity theory of money is traceable to Irving Fisher's famous equation of exchange:  $MV=PQ$ , where M stands for the stock of money; V for velocity of circulation of money; Q is the volume of transactions which take place within the given period; while P stands for the general price level in the economy.

### **3. Methodology**

This section explores the techniques and procedures applied in the collection of data and tools for statistical analysis.

**3.1. Variables, Sources and Method of Data Analysis**

The variable for the study are basically annual time series data on gross domestic product (GDP), a proxy for economic growth, unemployment rate (UNEMP), inflation rate (INFL), money supply (MS) and exchange rate (EXCR) respectively. The data ranges from 1981 to 2015, a period of thirty-four (34) years. Money supply and exchange rate are used as control variables to avoid the problem of omitted variable bias in the model so as to get a more realistic model. The data for the study were collected from the Central Bank of Nigeria statistical bulletin and World Bank Development indicators (WBDI) database. Gross domestic product is measured in billions of naira while unemployment rate, inflation rate, money supply and exchange rate are expressed in percentage terms respectively. The study shall adopt various econometric tools of analysis to answer the objectives earlier enumerated in section one. The Econometric Software of E-view 9.0 would be used in estimating the model. The Augmented Dickey-Fuller and Phillip-Perron Unit Root Test and Bounds Test method of cointegration is employed as a test of stationarity and longrun relationship of the time series data, while the ARDL approach will be used to test for the long run and shortrun relationship among the variables in the model.

**3.2. Unit Root Stationarity Test**

For the purpose of avoiding the situation of generating spurious results as unit root is normally associated with majority of time series data, the study started by conducting the unit root test on the annual data for the variables (on gross domestic product (GDP), a proxy for economic growth, unemployment rate (UNEMP), inflation rate (INFL), money supply (MS) and exchange rate (EXCR) respectively). The Augmented Dickey Fuller (ADF) and Philip-Perron unit root test of stationarity is employed to determine the underlying

properties of the process that generated the time series, that is, whether the variables of interest have unit root or not.

**3.3. Cointegration Test**

If the stationarity properties of the series in the model are established, the next step is to proceed to establish if the time series variables could be used for long run prediction. A cointegration test is one sure way of establishing the presence or absence of such a long-term relationship. Economically speaking, two or more variables will be cointegrated if they have a long-term or an equilibrium relationship between or among them [33]. The Autoregressive Distributed Lag (ARDL) Bounds Testing approach shall be employed to test for cointegration in the next section.

**3.4. Estimation Techniques and ARDL Modelling Approach**

The method of estimation employed for this study is based on Auto-regressive Distributed Lag (ARDL) Model approach and Error Correction Mechanism (ECM) model. The ARDL modeling approach popularized by [34, 35, 36, 37] has numerous advantages. The main advantage of this approach lies in the fact that it can be applied irrespective of whether the variables are I(0) or I(1) and that none of the variables is stationary at I(2) and beyond (Pesaran and Pesaran 1997, pp. 302- 303). Another advantage of this approach is that the model takes sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework. Moreover, a dynamic error correction model (ECM) can be derived from ARDL through a simple linear transformation.

The ECM integrates the short-run dynamics with the long-run equilibrium without losing long-run information. It is also argued that using the ARDL approach avoids problems resulting from non-stationary time series data. This study illustrates the ARDL modelling approach by considering the following equation:

$$\text{Ln(GDP)} = \beta_0 + \beta_1 \text{Ln(UNEMP)} + \beta_2 \text{Ln(INFL)} + \beta_3 \text{Ln(MS)} + \beta_4 \text{Ln(EXCR)} + \mu_t \dots \tag{1}$$

- Where
- GDP = Gross Domestic Product
- UNEMP = Unemployment
- INFL = Inflation
- EXCR = Exchange Rate
- MS = Money Supply
- $\mu_t$  = Error term

Moreover,  $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$  are the respective parameters. LnGDP is the natural log of Gross Domestic Product, LnUNEMP is the natural log of unemployment, LnINFL is the natural log of exchange rate, LnEXCR is the natural log of exchange rate and Ln(MS) is the natural log of money supply.

The equation of ARDL is as follows:

$$\Delta \text{Ln(GDP)}_t = \beta_0 + \beta_1 \text{Ln(GDP)}_{t-1} + \beta_2 \text{Ln(UNEMP)}_{t-1} + \beta_3 \text{Ln(INFL)}_{t-1} + \beta_4 \text{Ln(EXCR)}_{t-1} + \beta_5 \text{Ln(MS)}_{t-1} + \sum_{i=1}^n \alpha_1 \text{UNEMP}_{t-i} + \sum_{i=1}^n \Theta_2 \text{INFL}_{t-i} + \sum_{i=1}^n \delta_3 \text{EXCR}_{t-i} + \sum_{i=1}^n \gamma_4 \text{MS}_{t-i} \tag{2}$$

where:

The null and alternative hypotheses are as follows:

$$H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4 \text{ (No long run relationship exist)}$$

Against the alternative hypothesis:

$$H_0: \beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \text{ (Long run relationship exist)}$$

The ARDL approach to cointegration involves three stages. In the first stage, the hypothesis that cointegration is absent is tested. More specifically, the null hypothesis is that the coefficients of lagged regressors (in levels) in the underlying ARDL error correction model are jointly equal to zero. The null hypothesis is defined by:  $H_0: \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_4$  (No long run relationship exist) and it is tested against

the alternative hypothesis that  $\beta_0 \neq \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4$  (Long run relationship exist).

The ARDL approach uses the F-test to determine the presence (or not) of a cointegrating relationship between variables, although the asymptotic distribution of the F-statistic in this context is not standardized without taking account of whether the variables are I(0) or I(1). The critical values of this distribution are given in Pesaran and Pesaran (1997), and Pesaran et al. (2001). Two sets of values are presented in the form of a table. The first set assumes that all the variables are I(1), while the second set assumes that all the values are I(0). This makes it possible for the variables to be stationary and first-order integrated. If the value of the calculated F-statistic is higher than the highest value of this region, the null hypothesis is rejected, thus indicating the presence of cointegration between variables without taking account of whether they are I(1) or I(0). If the value of the F-

statistic falls below this region, the null hypothesis of no cointegration cannot be rejected, whereas an F-value lying within the region implies that the result of the test is indeterminate.

If the existence of a long-term relationship between the variables is borne out, the second stage in the analysis consists in estimating the short- and long-term parameters, using the ARDL approach. Once the long-term relationship between the variables is determined, then the estimates of the long-term ARDL can be obtained. If a long-term relationship between the variables exists, then there also exists an error-correction representation. Consequently, the error correction model is estimated in the third step; it indicates the speed of adjustment to long-term equilibrium following a short-term shock.

A general error-correction representation of Equation one is formulated as follows:

$$\sum_{i=1}^n \alpha_1 \Delta \text{UNEMP}_{t-i} + \sum_{i=1}^n \theta_2 \Delta \text{INFL}_{t-i} + \sum_{i=1}^n \delta_3 \Delta \text{EXCR}_{t-i} + \sum_{i=1}^n \gamma_4 \Delta \text{MS}_{t-i} + \varphi_1 \text{ECM}_{t-1} + \mu_t \quad (3)$$

Where

$\varphi$  = Speed or rate of adjustment;  $\alpha_1, \theta_2, \delta_3, \gamma_4, \beta_5$ , represents the coefficients of the variables respectively;  $\Delta$  is the difference operator,  $n$  is the lag length of the variables;  $ect_{t-1}$  denotes the residual from the cointegration equation (the error correction term), and  $\mu_t$  is the uncorrelated white noise residuals.

### 3.5. ARDL Model Testing Procedure

The ARDL model testing procedure starts with conducting the bound test for the null hypothesis of no co-integration. The calculated F-statistic is compared with the critical value tabulated by Pesaran and Pesaran (1997) or Pesaran et al. (2001). If the test statistic exceeds the upper critical value, the null hypothesis of no long-run relationship can be rejected regardless of whether the underlying orders of integration of the variables are zero or one. Similarly, if the test statistic falls below a lower critical value, the null hypothesis is not rejected.

However, if the sample test statistic falls between these two bounds, the result is inconclusive. When the order of integration of the variables is known and all the variables are I(1), the decision is made based on the upper bound. Similarly, if all the variables are I(0), then the decision is made based on the lower bound. The model can be selected using the model selection criteria like Schwartz-Bayesian Criteria (SBC) and Akaike's Information Criteria (AIC). SBC is known as the parsimonious model: selecting the smallest possible lag length, whereas AIC is known for selecting the maximum relevant lag length. In the second step, the long

run relationship is estimated using the selected ARDL model. When there is a long run relationship between variables, there exists an error correction representation.

Therefore, in the third step, the error correction model is estimated. The error correction model result indicates the speed of adjustment back to the long run equilibrium after a short run shock. To ascertain the goodness of fit of the ARDL model, the diagnostic test and the stability test are conducted. The diagnostic test examines the serial correlation, functional form, normality and heteroscedasticity associated with the model.

The structural stability test is conducted by employing the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ). Examining the prediction error of the model is another way of ascertaining the reliability of the ARDL model. If the error or the difference between the real observation and the forecast is infinitesimal, then the model can be regarded as best fitting.

## 4. Results and Discussion

### 4.1. Data Presentation

This study is to examine the impact of unemployment and inflation on economic growth in Nigeria between 1981-2015. The variables being studied include gross domestic product is expressed in billions of naira while unemployment, inflation rate, exchange rate and money supply are all expressed in percentages. See table 1 below for data presentation.

**Table 1.** Data Presentation on Dependent and Independent Variables in the Model.

	GDP	UNEMP	INFL	MS	EXCR
1981	6.11E+10	4.70	20.81282	29.45752	0.617708
1982	5.14E+10	4.80	7.697747	31.11037	0.673461
1983	3.55E+10	6.70	23.21233	32.83836	0.724410
1984	2.85E+10	6.70	17.82053	33.02333	0.766527

	GDP	UNEMP	INFL	MS	EXCR
1985	2.89E+10	6.70	7.435345	31.48268	0.893774
1986	2.07E+10	8.50	5.717151	31.51216	1.754523
1987	2.41E+10	5.30	11.29032	25.81954	4.016037
1988	2.33E+10	5.80	54.51122	25.96019	4.536967
1989	2.42E+10	5.80	50.46669	18.98473	7.364735
1990	3.08E+10	5.20	7.364400	20.44169	8.038285
1991	2.74E+10	5.80	13.00697	24.02745	9.909492
1992	2.93E+10	6.70	44.58884	23.23999	17.29843
1993	1.58E+10	6.00	57.16525	27.74994	22.06540
1994	1.81E+10	5.40	57.03171	28.23150	21.99600
1995	2.85E+10	4.10	72.83550	15.87022	21.89526
1996	3.50E+10	4.10	29.26829	13.23075	21.88443
1997	3.58E+10	4.10	8.529874	14.78455	21.88605
1998	3.20E+10	4.10	9.996378	18.66342	21.88600
1999	3.59E+10	4.10	6.618373	21.12571	92.33810
2000	4.64E+10	4.10	6.933292	21.96325	101.6973
2001	4.41E+10	4.10	18.87365	26.66987	111.2313
2002	5.91E+10	4.10	12.87658	21.82599	120.5782
2003	6.77E+10	4.10	14.03178	20.19996	129.2224
2004	8.78E+10	4.10	14.99803	18.25631	132.8880
2005	1.12E+11	4.10	17.86349	17.73216	131.2743
2006	1.45E+11	4.10	8.239527	19.04188	128.6517
2007	1.66E+11	4.10	5.382224	28.05878	125.8081
2008	2.08E+11	15.70	11.57798	37.76613	118.5460
2009	1.69E+11	12.40	11.53767	43.26613	148.9017
2010	3.69E+11	10.50	13.72020	21.02587	150.2980
2011	4.12E+11	8.90	10.84079	20.68483	153.8616
2012	4.61E+11	8.60	12.21701	21.20013	157.4994
2013	5.15E+11	8.40	8.475827	21.36449	157.3112
2014	5.68E+11	15.70	8.057383	20.16246	158.5526
2015	4.81E+11	18.34	9.017684	19.54045	192.4405

Source: National Bureau for Statistics (NBS), WBDI and IMF Data.

#### 4.2. Presentation of Augmented Dickey Fuller and Philip-Perron Unit Roots Tests

Before carrying out the ARDL bounds test, stationarity properties of all the variables in the model is to be determined to know the order of integration for each variable. This is a necessary step to ensure that variables are not second-order stationary (i.e., I(2)) and to avoid fallacious results. According to Ouattara (2006), the

calculated F-statistics which Pesaran et al. (2001) provide are not valid in the presence of I(2) variables, since the bounds tests are based on the assumption that variables are either I(0) or I(1). Consequently, the use of unit root tests in the ARDL procedure may still be needed to make sure that none of the variables is integrated of order 2 or beyond. The results from the ADF unit root tests are hereunder tabulated:

Table 2. Augmented Dickey Fuller and Philip-Perron Unit Root Test with Intercept.

Variable		Level t-statistic value	1 <sup>st</sup> Difference t-statistic value	5% Critical Value	Order of Integration
Log(GDP)	ADF	----	-5.332256	-2.954021	I(1)
	P-P	----	-5.322900	-2.954021	I(1)
Log(UNEMP)	ADF	----	-6.250013	-2.954021	I(1)
	P-P	----	-6.595584	-2.954021	I(1)
Log(INFL)	ADF	-3.203646	----	-2.951125	I(0)
	P-P	-3.210676	----	-2.951125	I(0)
Log(MS)	ADF	-3.774423	----	-2.951125	I(0)
	P-P	-3.777314	----	-2.951125	I(0)
Log(EXCR)	ADF	----	-4.959554	-2.954021	I(1)
	P-P	----	-4.959554	-2.954021	I(1)

Source: Author's computation from E-views 9.0

The results from Augmented Dickey Fuller (ADF) test reveals that gross domestic product, unemployment rate and exchange rate are all integrated of order one I(1) while inflation rate and money supply are integrated of order one I(0). Having determined that the orders of integration of the variables retained in the model are either 0 or 1, the ARDL bounds test can then be safely applied to determine the cointegration relationship among the variables in the model.

#### 4.3. ARDL Bounds Testing

The cointegration test results are reported in Table 3. From the ARDL Bounds Testing, the calculated F-statistics of the Wald Test reveals a figure of 4.850549, a value that is greater than the higher and lower bounds of the 95 percent critical value interval (2.56 – 3.49). This implies the rejection of the null hypothesis that no long-run relationship exists between the variables, hence it is concluded that there is evidence of cointegration or of the existence of a long-run equilibrium relationship between the series in the model between 1981 – 2015.

**Table 3.** Cointegration Test using ARDL Bounds Testing Approach.

Test Statistic	Value	K
F-Statistic	4.850549	4
Critical Value Bounds		
Significance	<i>I(0) Lower Bounds</i>	<i>I(1) Upper Bounds</i>
5%	2.56**	3.49
1%	3.29	4.37
10%	2.2	3.09

Notes: The critical values are taken from Pesaran and Pesaran (1997: 478) with five regressors.

\*\* denote rejecting the null at 5% level of significance.

Source: Author's Computation Using E-views 9

#### 4.4. Estimation of the Long-Run and Short-Run Dynamics

After proving the existence of a long-run relationship between the variables of the model, the second step of the methodology consists in estimating the short- and long-run coefficient estimates of the model. The empirical results of the ARDL (1, 2, 0, 1, 1) are presented below, and they show the long run and short run coefficients.

The parameter estimates for the equation are as follows:-  
Long-run coefficients:

$$\text{Cointeq} = \text{Log}(\text{Gdp}) - (-0.8017 * \text{Log}(\text{Unemp})) - 1.5717 * \text{Log}(\text{Infl}) + 1.0766 * \text{Log}(\text{Excr}) + 1.8048 * \text{Log}(\text{Ms}) + 22.1249$$

**Table 4.** Shortrun Error Correction Model output.

Variable	Coefficient	Standard Error	T-Statistic	Prob. Value
DLOG(MS)	-0.677417	0.155352	-4.360514	0.0002
ECM(-1)	-0.257865	0.049889	-5.168778	0.0000

Source: Author's Computation Using E-views 9

Evident from the above result is the fact that in compliance with economic a priori expectations, both unemployment and inflation variables appeared with negative signs (-0.8017 and -1.5717 respectively) showing inverse relationship with the dependent variable (Gross Domestic Product). Similarly, in line with a priori expectations, exchange rate and money supply appeared with positive sign. Holding other factors affecting Gross Domestic Product (GDP) constant, a percentage increase in the rate of unemployment will reduce GDP by about 2.08%, while a percentage increase in the rate of inflation (INFR) will reduce gross domestic product by about 0.5%. On the other hand, the longrun estimates reveals that a percentage increase in the quantity of money in circulation in the economy will increase gross domestic product by 1.8048 percentage all things being equal. Similarly, a percentage increase in exchange rate leads to approximately 8 percentage increase in gross domestic product within the period of study.

Findings from the short-run regression output reveals that the coefficient of money supply appeared with a negative sign which implies that money supply by the monetary authority adversely affected economic growth in Nigeria in the shortrun. The result indicates that money supply is

contractionary. By inference, a percentage increase in the stock of monetary instruments in the economy will lead to approximately sixty-eight percentage decrease in Gross Domestic Product. This outcome negates findings in economic literature that posit a positive relationship between money supply and growth.

The coefficient of the error correction term (ECT) in the model is negatively signed and highly significant which is a feature for model stability. The speed of adjustment back to equilibrium annually is -0.257865 which implies a rapid adjustment and suggests the convergence to equilibrium after shocks. The estimated coefficient value of 0.26 (26%) for the error correction term suggests that the system corrects its previous period's disequilibrium from long-run volatility by 26% a year. Explicitly, the coefficient of the error correction term shows the speed of adjustment at which gross domestic product adjust to changes in the independent variables. The significance of the error correction term confirms the earlier conclusion that a long run relationship exist between gross domestic product and its explanatory variables.

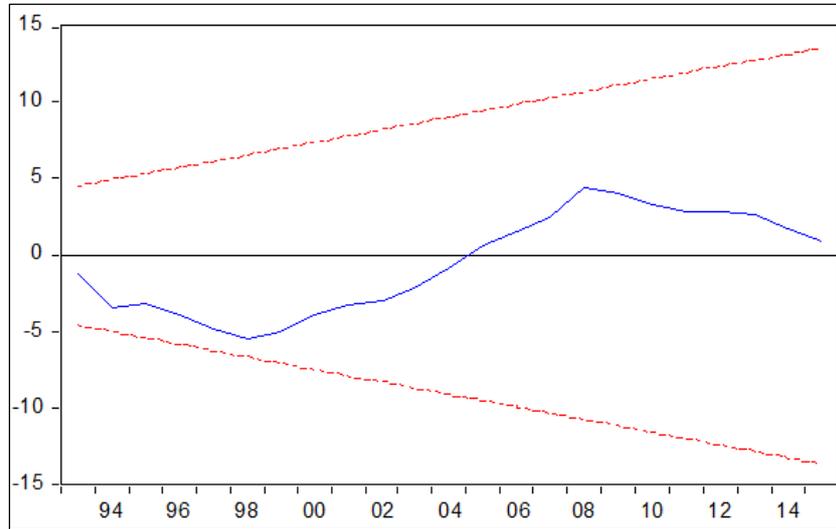
#### 4.5. Robustness Checks

As a result of various problems associated with long run estimation, various post diagnostics tests were conducted, such as normality test, heteroscedasticity test and stability test. The results of the test indicate that the normality test (JB) statistic of 5.629184 with P-value of 0.059929 that is 0.6% probability which implies that the null hypothesis of normally distributed error term cannot be rejected. In addition, the estimated model satisfies the Breusch-Godfrey

(BG) serial correlation and heteroscedasticity test as indicated by an observed F-statistic probability value of 46% and 49% respectively. To determine the stability of the estimated coefficients of the real domestics' equation for Nigeria, the cumulative sum of recursive (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests, developed by Brown *et al.* (1975), were

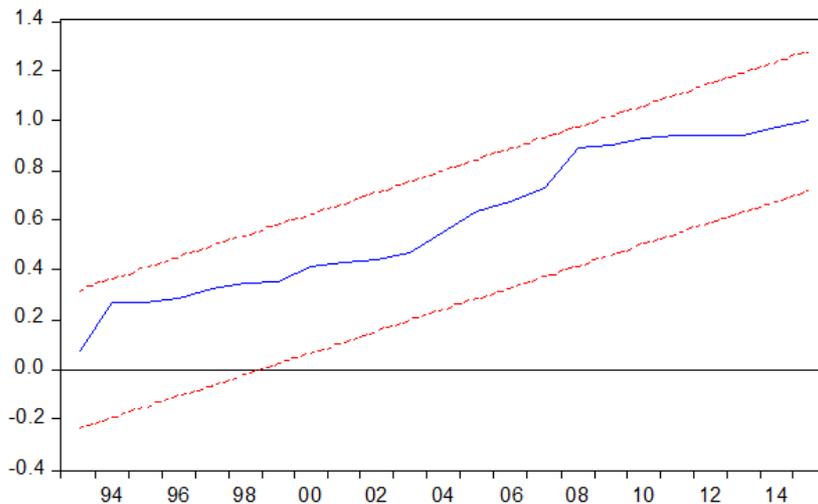
adopted. The CUSUM and CUSUMSQ tests are shown below:

From figures above, both the CUSUM and CUSUMSQ plots do not cross the 5% critical lines, implying that over the entire sample period of investigation, the stability of the estimated coefficients exist, so that the regression coefficients are reliable and suitable for policy making



Source: E-views version 9.0

Figure 2. CUSUM graph.



Source: E-views version 9.0

Figure 3. CUSUM graph.

### 5. Conclusion

This study has attempted an examination of the impact of unemployment and inflation on the Nigerian economy over the period of 34 years (1981 to 2015). Variables like unemployment rate, inflation rate, exchange rate and money supply that have direct bearing on the study were incorporated into our model, given their inter-relations with the dependent variable the Gross Domestic Product (GDP).

According to the results, the stationary test indicates that the GDP, UNEMP and EXCR were all stationary at the first difference, while MS and INFL were stationary at level. The bounds testing (ARDL) approach to cointegration revealed the existence of a long run equilibrium relationship among the series gross domestic product and unemployment rate, inflation rate, money supply and exchange rate within the period under reference. The ARDL longrun results shows that unemployment have an insignificant impact on economic growth. In fact its impact on the economy remains negative

and adverse. As evident from the result, a unit increase in unemployment will result in a decrease of 0.8017 in economic growth in Nigeria. This high unemployment figures showed that companies have been closing shop or incapacitated to absorb job seekers due to either low aggregate demand or poor infrastructural facilities like epileptic power supply, bad roads and insecurity that have impeded productivity in the country.

The study also established an inverse relationship between inflation and economic growth within the period under reference, indicating how a rising inflationary trend impact adversely on gross domestic product as consumers' purchasing power is whittled down and almost completely eroded by the unprecedented increases in the prices of goods and services. These inflationary trends mostly affect fix income earners, especially the civil servants and company workers, who barely survive in the midst of an unsustainable inflationary spiral. Empirical evidence from the coefficient of exchange rate adduce to the fact that a fast appreciating naira with little or nothing to export is a threat to economic growth. Economic theory postulate that only a nation with sufficient exports products can gain from appreciation in her currency. However, in the case of Nigeria with little or nothing of value to export except her crude oil and some primary products, she stands to benefit nothing from an appreciating currency. Conversely, our imports will become extremely costly, leading to higher prices for goods and services with attendant prospects of increasing inflationary pressures in the economy thus contributing to the growing unemployment figures and a decline in economic growth. The significance of the error correction term confirms the earlier conclusion that a long run relationship exists between gross domestic product and the independent variables in the model. Worthy of note is the fact that unemployment has a higher impact in the longrun than in the shortrun, thus necessitating the need for government to formulate job-creating policies that will help stem this tide, as any nation with a persistent record of unemployed able-bodied men risks violent revolution in the long-run.

Based on the foregoing conclusion, the following recommendations are made:

(1) Government employment agencies should disseminate information about job vacancies in order to match jobs and workers, more efficiently. Also, government should provide unemployment benefit to the unemployed as it is the case in countries such as United States of America, Libya etc to help cover the unemployed. Furthermore, there should be policies designed to incorporate entrepreneurship training in schools starting from secondary schools to tertiary institutions. When that is done, graduates should be given a lump sum amount after their National Youth Service Corps to enable them start up business. Though some graduates may not utilize the money for the desired purpose, there could still be a monitoring and advisory body in place that would see to proper utilization of this fund. The monitoring and advisory body could perform this function on each batch of young entrepreneurs for two to three years after the business is established to ensure sustenance.

(2) In a bid to control the naira exchange rate since it does have bearing on inflation, the government should put in place an enduring framework to buffet the risk of the domestic producers for them to take innovative roles of developing and manufacturing products that will have competitive advantage in the international markets. This is critical to the realization of a stable inflation rate and self-reliance for Nigeria.

(3) Government should revitalize the various ailing industries and establish new ones to encourage massive industrialization. With functional industries working to full capacity, our agricultural products often exported in their raw form would have value addition before they are eventually exported. This strategy will not only create massive jobs for our teeming graduates but bring in more forex to boost our foreign reserve and reduce the country's persistent balance of payment challenges.

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