
AN APPRAISAL OF THE CAUSAL RELATIONSHIP BETWEEN UNEMPLOYMENT AND INFLATION ON THE NIGERIA ECONOMY (1985-2015)

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Abstract: *This research work examines the inflation and unemployment in Nigeria by testing if there is any causality between unemployment and inflation. The study adopted a distributed lag model with data covering the period of 1985-2015. The unemployment rate was regressed on inflation rate, government expenditure rate, interest rate and gross domestic product. The result reveals that unemployment and inflation are statistically significant bi-directional causality between inflation and unemployment in Nigeria. The study recommends that the economy should be diversified and appropriate policies should be put in place by government and the monetary authorities in order to curb the menace of inflation and unemployment and consequently reduce the problem of stagnation in Nigeria. Again, there is a need for strong institutional collaboration in dealing with these two macroeconomic variables.*

Keywords: *inflation, product, macroeconomics, unemployment*

Introduction

Undoubtedly, parts of the macroeconomic goals which the government strives to achieve are the maintenance of full employment, price stability, high (but sustainable economic growth), and balance of payment equilibrium. Macroeconomic objectives are judged by three broad measures- unemployment rate, inflation rate, and the growth rate of output (Ugwuanyi, 2004). Unemployment has been categorized as one of the serious problem of social progress. Apart from representing an extraordinary waste of the country's manpower resources, it generates welfare loss in term of lower output thereby leading to income and wellbeing decline for the people (Raheem, 1993).

Inflation on the other hand, is a persistent tendency for prices and money wages to increase. Inflation is measured by the proportional changes over time in some appropriate price index, commonly a consumer price index or a GDP deflator (Ekpo, 2012). Furthermore, the

classical argued that there is a Natural rate of unemployment, which may also be called the equilibrium level of unemployment in a particular economy. The unemployment rate which would prevail in an economy with a constant rate of inflation. It is a function of various man-made institutional factors, including the extent of industrial monopoly, the social security system, minimum wage legislation, restrictions on mobility between occupations and trade-union organizations. At any time, the natural rate of unemployment will also be affected by the past history of actual unemployment, if the effect of unemployment is to make people less employable. 'Natural' is used here to indicate that this unemployment rate cannot be permanently reduced simply by demand management; any attempt to do this will result in ever-rising inflation. It does not mean that this level of unemployment is either desirable or inevitable. Thus, they assumed that in the long-run unemployment rate would stay fixed in spite of the changes in the inflation rate, so there is no relationship between the two variables in the long-run. Keynes for instance described inflation as the excess of expenditure over income at full-employment level. He contended that the greater the aggregate expenditure, the larger the inflationary gap and the more rapid the inflation. As for unemployment, the Keynesian economists hold that an increase in unemployment reduces income, which reduces consumption, and reduces aggregate output.

As a result, employment can be increased by increasing consumption or investment. The monetarist on the other hand, explained inflation in terms of excessive growth of the money supply relative to real output. Their view on unemployment, however, is framed within the context of Milton Friedman's permanent income hypothesis. Based on the Permanent Income Hypothesis (PIH), a reduction in employment and current receipts only affects output to the extent that the anticipated income declines (Ekpo, 2012). There were however, no major attempts made to examine inflation and unemployment simultaneously. It was not until 1958, following the introduction of Phillip's curve by A.W. Phillips, that traditional economics began to examine unemployment and inflation simultaneously, thereby postulating a trade-off between inflation and unemployment- a lower inflation rate must be willing to put-up with a higher level of unemployment, and vice-versa (Robert 1976). Unemployment and inflation are issues that are central to both the social and economic life of every country. The existing literature refers to unemployment and inflation as constituting a vicious circle that explains the endemic nature of poverty in developing countries. And it has been argued that continuous improvement in productivity- which brings about the adequate supply of goods and services - is the surest way to breaking the vicious circle. The oil boom in the 1970s led to the mass migration of youths into the urban area, seeking to get work. However, following the recession experienced in the 1980s, the available data revealed that, the problem of unemployment started to manifest, precipitating the introduction of the Structural Adjustment Programme (SAP), the rapid depreciation of the naira exchange rate and the inability of most industries to import the raw materials required to sustain their output levels (Ekpo, 2012).

A major consequence of the rapid depreciation of the naira was the sharp rise in the general price level (inflation), leading to a significant decline in the real wages. The low wages in turn fuelled a weakening purchasing power of wage earners and a decline in the aggregate demand. Consequently, industries started to accumulate unintended inventories and, as a rational economic agent, the manufacturing firms started to rationalize their market prices. With the simultaneous rapid expansion in the educational sector, new entrants into the labour

market increased beyond absorptive capacity of the economy. Thus, the avowed government's objective of achieving "full employment" failed (Ekpo, 2012). The research work is therefore intended to examine the relationship between inflation and unemployment in Nigeria.

Statement of the Problem

Anthony De Mello in his famous book titled 'Awareness' stated that."Life is a banquet. And the tragedy is that most people are starving to death" (Anthony De Mello, 1992). This situation is prevalent in the Nigerian economy. Nigeria is richly blessed with abundant human and natural resources, but still finds itself battling with high unemployment and inflation rates, due to years of neglect of the social infrastructures and general mismanagement of the economy. Previous governments in their own capacities have been embarking on various policies to control inflation and reduce the level of unemployment in the country. However, government efforts have not yielded the desired results as these problems are known to be increasing rather than decreasing (Ekpo, 2012).

The problem of inflation in Nigeria was brought about by the oil glut in 1981, which resulted into balance of payment deficits leading to foreign exchange crisis that necessitated various measures of import restrictions. These restrictions reduced raw materials for domestic production and spare parts for machinery operation. The resultant shortage of goods and services for local consumption spurred the inflation rate to rise from 20% in 1981 to 39.1% in 1984 (Itua, 2000). The increase in unemployment in Nigeria, on the other hand, has resulted to decrease in consumption, due to low income earned by the citizens, thereby resulting to low production- the inability of firms to sell their goods, forces them to reduce their output. This has led to decrease in the economic growth of the nation. Unemployment also has social consequences as it increases the rate of crime. Also, being without a job in Nigeria, is as good as losing your self-respect and self-esteem among the people of your age bracket. The proportion of workers who are unemployed shows how well a nation's human resources are used and serves as an index of economic movement (positive or negative). Hence, it becomes necessary to embark on this study which seeks to investigate the casual relationship between inflation and unemployment in Nigeria.

Objectives of the Study

The study is aimed at investigating the causal relationship between unemployment and inflation on the Nigeria Economy. The Specific objectives are:

1. To analyze if there is any causal relationship between unemployment and inflation in the Nigeria Economy.
2. To ascertain the impact of government expenditure on unemployment and inflation.

Research Questions

The research questions are as follows:

1. Is there any causal relationship between unemployment and inflation in Nigeria?
2. Does government expenditure have any significant impact on unemployment and inflation?

Research Hypothesis

The study is guided by the following hypothesis:

1. H_0 : There is no relationship between inflation and unemployment in Nigeria.

2. H_0 : Government expenditure has no impact on unemployment and inflation in Nigeria.

Scope of the Study

The research work intends to study inflation and unemployment situation within the Nigeria Economy. The study will cover the time period of 1986-2015 (a period of 30 years); this is to ensure updated information and to follow the trend. The range was chosen based on data availability and to have adequate observation for a meaningful analysis.

Significance of the Study

Why has unemployment and inflation continued to rise despite the substantial increase in the nation's GDP? Is it that successive governments neglected the issue of unemployment and inflation or has the twin problems defied all economic theories? These are questions that need immediate answers, because unemployment and inflation are current issues that are affecting our country and which are being discussed by both experts and laymen alike. Therefore, this study will be of good importance to economic rational-thinkers, as it will equip them with knowledge and skills needed to tackle the pressing issue of unemployment and inflation in our country. Also, to those who would like to carry out further research in this area, it would be of valuable pointer to a direction in their future research works.

Definition of Terms

1. Unemployment: The state of having no job; joblessness. It can also refer to the level of joblessness in an economy, often measured as a percentage of the workforce.
2. Inflation: an increase in the general level of prices or in the cost of living of an economy.
3. Government expenditure: government expenditure or spending includes all government consumptions, investments, and transfer payment. It can be financed by government borrowing or taxes. Change in government spending is a major component of fiscal policy, used to stabilize the macroeconomic business cycle. (Economics dictionary by John Black).

Literature Review

Conceptual Clarification on Unemployment

Unemployment has no precise definition in economics literature. To the layman, unemployment means a state of joblessness, while to economist, inability to obtain a job when one is willing and able to work. This can be measured in two ways; official registration with state agency, which carries some form of income support, and self-assessment by a random sample of the population. Self-assessment generally produces higher figures. The rate of unemployment rate is the unemployed as a percentage of the total labour force, defines employees plus unemployed. Official measures rarely correspond exactly to an economist's ideal definition of unemployment. They take no account of people who would prefer full-time work but can only find part-time jobs, or people over pensionable age who would prefer to work. They do, however, include some people who are doubly employable, or simply do not want work. In other words, no matter how unemployment is defined; the underlying philosophy is that those who are expected to work are indeed not working (Gbosi, 2004). The level of unemployment in a nation is measured by calculating the unemployment rate, i.e.:

$$\text{Unemployment Rate (U)} = \frac{\text{Number of people unemployed} \times 100}{\text{Labour force}}$$

Types of Unemployment

1. **Structural Unemployment:** This occurs when there is a change in the structure of an industry or the economic activities of a country. As an economy develops over time the type of industries may well change. This may be because people's tastes have changed or it may be because technology has moved on and the product or service is no longer in demand.
2. **Frictional Unemployment:** This type of unemployment is caused by industrial friction, such as, immobility of labour, ignorance of job opportunities, shortage of raw materials and breakdown of machinery, etc. Jobs may exist, yet the workers may be unable to fill them either because they do not possess skill or because they are not aware of the existence of such jobs. On average it will take an individual a reasonable time period for him or her to search for the right job.
3. **Seasonal Unemployment:** This is due to seasonal variations in the activities of particular industries caused by climatic changes, changes in fashions or by inherent nature of such industries. The rain coat factories are closed down in dry season throwing workers out of their jobs because there is no demand for rain coat during dry season. Such seasonal industries are bound to give rise to seasonal unemployment.
4. **Cyclical Unemployment:** This type of unemployment (also known as Keynesian unemployment or the demand deficient unemployment) is due to the operation of the business cycle. This arises at a time when aggregate demand of the community becomes deficient in relation to the productive capacity of the country. In other words, when aggregate demand falls below the full employment level, it is not sufficient to purchase the full employment level of output.
5. **Disguised Unemployment:** Disguised unemployment exists where part of labour force is left without work or is working in a redundant manner where workers productivity is essentially zero. It is unemployment that does not affect aggregate output. An economy demonstrates disguised unemployment where productivity is low and too many workers are filling too many Work (Okezie, 2011).

Causes of Unemployment

Nigeria, which is the biggest black nation in the world, ought to have a very strong economy capable of employing almost all employable citizens. But unfortunately, the unemployment rate in Nigeria is alarming, and below are major causes of unemployment in the country.

1. **Epileptic Electric Power Supply:** Lack of regular electric power supply is the biggest cause of unemployment in Nigeria. Talking of how lack electricity has caused unemployment in Nigeria, the matter is multi-faceted. Many foreign companies that would have come to invest in this country (considering the biggest marketing vista in Nigeria) and which would have provided many employment opportunities in Nigerians to reduced unemployment, have changed direction to other neighboring countries with constant electricity - supply in order to avoid operating loss with 24-hours running of generators which is now becoming traditions in Nigeria. The same problem has affected many local companies which could not

cope with the high cost of running electric plants/generators all the time, and were forced to fold up and threw their employees into the labour market.

2. **Poor Quality of Education:** Every year, many graduates come out of the universities and colleges of education in Nigeria with little or nothing to contribute to the society. According to the National Bureau of statistics, more than 200,000 alumnae graduate from Nigeria tertiary institutions yearly, but only very few number of them secure jobs after years of their graduation. The result is that they add to the unemployment level of the country each year.
3. **Lack of Skills:** Another problem that is closely related to that of poor quality education, as a cause of unemployment in Nigeria, is lack of skills. For many year running, most Nigeria youths have disdained acquisition of skills, thinking that the time spent on such is wasted, and opting for so-called 'clean-shirt' and easy ways of making money. With such mentality, these youths have grown into middle-age and even senior age without any skill to fall on, thus becoming liabilities to themselves and others.
4. **Negligence of Agriculture and Other Natural Resources:** Nigeria, as a country, is based with many un-utilized resources which are enough to gainfully engage every un-employed person. But the craze for quick oil money has made both government and individuals to direct all attention to only the oil industry.
5. **Corruption:** corruption can be defined as immoral action which could involve bribery, embezzlement or misappropriation of public funds for personal use. A corrupt government can be said to be a government which makes use of public funds for their (the government officials) own personal and selfish use. Corruption is a cause of unemployment in Nigeria because when those in government who are to use public money for building more industries are busy embezzling the funds for their selfish use, the result is massive increase in unemployment.

Conceptual Clarification on Inflation

In economics, inflation can be defined as the persistent tendency for prices and wages to increase. Inflation is measured by the proportional changes over time in some appropriate price index, commonly a consumer price index or GDP deflator. Consequently, inflation reflects a reduction in the purchasing power per unit of money - a loss of real value in the medium of exchange and unit of account within the economy. A chief measure of price inflation is the inflation rate, the annualized percentage change in a general price index, usually the consumer price index, over time. The opposite is deflation.

The Impact of Inflation

1. **General:** An increase in the general level of prices implies a decrease in the purchasing power of the currency. That is, when the general level of prices rises, each monetary unit buys fewer goods and services. The effect of inflation is not distributed evenly in the economy, and as a consequence there are hidden costs to some and benefits to others from this decrease in the purchasing power of money. For example, with inflation, those segments in the society which own physical assets, such as property, stock, etc., benefit from the price/value of their holdings going up, when those who seek to acquire them will need to pay more for them. Their ability to do so will depend on their degree to which their

income is fixed. Also, individuals or institutions with cash assets will experience a decline in the purchasing power of the cash. Increases in the price level (inflation) erode the real value of money (the functional currency) and other items with an underlying monetary nature.

2. **Negative:** High or unpredictable inflation rates are regarded as harmful to an overall economy. They add inefficiencies in the market, and make it difficult for companies to budget or plan long-term. Inflation can act as a drag on productivity as companies are forced to shift resources away from products and services in order to focus on profit and losses from currency inflation. Uncertainty, about the future purchasing power of money discourages investment and saving. Inflation can impose hidden tax increases, for instance inflated earnings push taxpayers into higher income tax rates unless the tax brackets are indexed to inflation. With high inflation, purchasing power is redistributed from those on fixed nominal incomes, such as some pensioners whose pensions are not indexed to the price level, towards those with variable incomes whose earnings may better keep pace with the inflation. There can also be negative impacts to trade from an increased instability in currency exchange prices caused by unpredictable inflation.
3. **Positive:** Nominal wages are slow to adjust downward. This can lead to prolonged equilibrium and high unemployment in the labour market. Since inflation allows real wages to fall even if nominal wages are kept constant, moderate inflation enables labour markets to reach equilibrium faster. The primary tools for controlling the money supply are the ability to set the discount rate, the rate at which banks can borrow from the central bank, and open market operations, which are the central bank's interventions into the bonds market with the aim of affecting the nominal interest rate. If an economy finds itself in a recession with already low or even zero, nominal interest rates, then the bank cannot cut these rates further.

Unemployment-Inflation Relationship

Even though unemployment is painful to those who have no source of income, reducing unemployment is not costless. In the short-run, a reduction in unemployment may come at the expense of a higher rate of inflation, especially if the economy is close to full capacity, where resources are almost fully employed. There are two possible explanations of this relationship—one in the short-run and another in the long-run. In the short-run, there is an inverse relationship between the unemployment and inflation (Phillips curve), while it has been observed by economists that in the long-run the concepts of unemployment and inflation are not related.

1. The Phillips Curve

The Phillips Curve was named after the British economist A.W. Phillips, who first examined the relationship between the rate of unemployment and the rate of money wage changes. In economics, the Phillips curve is a historical inverse relationship between rates of unemployment and corresponding rates of inflation that result in an economy. While there is a short run relationship between unemployment and inflation, it has not been observed in the long run. Milton Friedman asserted that the Phillips curve was only applicable in the short run and that in long run; inflationary policies will not decrease unemployment (www.wikipedia.com).

Accordingly, the Phillips curve is now seen as too simplistic, with the unemployment rate

supplanted by more accurate predictors of inflation based on velocity of money supply measures such as the money zero maturity velocity, which affected by unemployment Phillips derived an empirical result that there was an inverse relationship between the rate of unemployment and the rate of increase in money wages. Phillips found a consistent inverse relationship: when unemployment was high, wages increased slowly; when unemployment was low, wages rose rapidly.

2. The short-run Philips curve

The long-run Philips curve is a vertical line at the natural rate of unemployment, so inflation and unemployment are unrelated in the long run. The Philips curve shows relationship between inflation and unemployment, but how accurate is the relationship in the long run? According to economists, there can be no relationship between inflation and unemployment in the long run. Decrease in unemployment can lead to increases in inflation, but only in the short run. In the long run, inflation and unemployment are unrelated. The natural rate of unemployment theory, also known as the non-accelerating inflation rate of unemployment (NAIRU) theory was developed by economists Milton Friedman and Edmund Phelps. According to NAIRU theory, expansionary economic policies will create only temporary decreases in unemployment as the economy adjust to natural rate. Moreover, when unemployment is below the natural rate, inflation will accelerate. When unemployment rate is equal to the natural rate, inflation is stable or non-accelerating. Assume the economy starts at point A and has an initial rate of unemployment and inflation rate. If the government decides to pursue expansionary economic policies, inflation increase as aggregate demand shifts to the right. This is shown as a movement along the short run Philips curve, to point B, which is an unstable equilibrium. As aggregate demand increases, more workers will be hired by firms in order to produce more output to meet rising demand, and unemployment will decrease. However, due to the higher inflation, workers' expectations of future inflation changes, which shift the short run Philips, curve to the right, from unstable equilibrium point C. At point C, the rate of unemployment has increased back to its natural rate, but inflation remains, higher than its initial level of Inflation rate.

Theoretical Framework

In economics literature, there are different theories of unemployment, such as the Keynesian theory, classical theory, the efficiency-wage theory, the insider-outsider theory, etc. Below, the Classical and the Keynesian theories of unemployment will be briefly discussed.

1. **Keynesian Theory of Unemployment:** Keynesian theory of unemployment with his book *The Theory of employment, Interest and Money* (1936), Economist John Maynard Keynes (1883-1946) changed the way the world's perception of the workings of the economy. First, Keynes introduced the theory that the equilibrium is determined by aggregate demand. Aggregate demand is the amount of goods and services all buyers demand at various prices. According to Keynes when there is increase demand in economy, this will encourage companies to make more goods or provide more services. As his book was published, his

home country of Britain was going through the great depression. The inflation was through the roof and a lot of people were unemployed. Keynes saw the economy in terms of 'laissez faire'; for the economy to resolve itself since it goes through a business cycle. As Hubert Humphrey would say, "Prosperity is just around the corner". After two years of living in their cars and not being able to afford a decent meal, the people began to see holes in his theory. The Keynesian framework, as examined by Thirlwall (1979), Grill and Zanalda (1995) and Russian and Nadol (1997), postulate that increase in employment, capital stock and technological change are largely endogenous. Thus the growth of employment is demand determined and that the fundamental determinants of long-term growth of output also influence the growth of employment (www.wikipedia.com).

2. **Classical Theory of Unemployment:** The fundamental principle of the classical theory is that the economy is self-regulating. The classical view of unemployment states that the economy will achieve full employment (the natural rate of unemployment) if wages and prices are flexible. This view attests that unemployment occurs when wages rise too high to maintain equilibrium. When wages go up, firms can't afford to pay as many workers, so as many workers, so some may be laid off or fired, increasing unemployment. When this happens fewer people have money to buy things so demand goes down and prices tend to go down. Because unemployment is high, more people are looking for work giving firm more choice in who they hire and for how much. They results in decreasing wages. The classical view claims that unemployment rate will always go through correct itself to the natural unemployment rate.

Theories of Inflation

Different economists have presented different theories on inflation. There are three main theory of inflation, which are;

1. **Market-Power Theory of Inflation:** In an economy, when a single or a group of sellers together decide a new price that is different from the competitive price, then the price is termed as market-power price. Such groups keep prices at the level at which they can earn maximum profit without any concern for the purchasing power of consumers. According to the advanced version of market power theory of inflation, oligopolist can increase the price to any level even if the demand does not rise. This hike in price levels occurs due to increase in wages (because of trade unions) in the oligopolistic industry. The increase in wages is compensated with the hike in prices of products. With increase in the income of individuals, their purchasing power also increases, which further results in inflation.

2. **Conventional Demand-Pull inflation:** The market power of inflation represents one extreme end of inflation. According to this theory inflation exists even there is no excess demand. On the other end, the conventional demand-pull theorists believed that the only cause of inflation is the excess aggregate demand over aggregate supply. In full employment equilibrium condition, when demand increases, inflation becomes unavoidable. In addition in full employment condition, the economy reaches to its maximum production capacity. At this point, the supply of goods and services cannot be increased further while demand of products and services increases rapidly. Due to this imbalance between demand and supply, inflation takes place in the economy.

3. **Structural Theories of Inflation:** Apart from the two extreme ends mentioned in the above,

there is a middle group of economists called structural economists. According to structural theory of inflation, market power is one of the factors that cause inflation, but it is not the only factor. The supporters of structural theories believed that inflation arises due to structural maladjustments in the country or some of the institutional features of business environment,

Empirical Review of Related Literature

Several studies in the literature have investigated theoretical and empirical relationships between inflation and unemployment but what we have learnt from literature are the argument is still ongoing. This is as a result of the several conflicting and contrasting result obtained by some of these studies. One of the issues which have captured most of the debate is whether the propositions of A.W Philips holds true in reality or not. Aminu Umaru (2012) investigates the relationship between inflation and unemployment in the Nigeria economy from 1977 to 2009. The results indicate that inflation impacted negatively on unemployment. The causality test reveals that there is no causation between inflation and unemployment in Nigeria during the period of the study and a long-run relationship exists between them as confirmed by the co integration test.

Ravindra H. Dholakia and Amey A. Sapre (2011) estimate the inflation-unemployment in India using data for the period of 1950-2009. They estimate the regular Philips curve. The study reveals a regular trade-off between inflation and output and unemployment with inflationary expectations based on the experience of past three to four years. Onwioduokit (2006) investigated the relationship between unemployment and inflation in Nigeria and found that there is a negative relationship between unemployment and inflation with the coefficient of - 0.412, this validates the Phillips hypotheses; however, the results of the causality test indicated no causality between unemployment and inflation in Nigeria. Hogan (1998) examined the Phillips curve using the U.S. macroeconomic data from 1960 to 1993. Results of that study revealed that there had been a significant and negative relationship between unemployment and inflation although the Phillips curve appeared to over-predict the rate of inflation.

Arratibel et al. (2002) analyzed the New Keynesian Phillips curve with forward-looking expectations by using panel data. They found that the unemployment rates have significant relationship with non-tradable inflation rates. By contrast, Masso and Staehr (2005) used the dynamic panel data method and failed to identify a significant relationship between unemployment rate and inflation rates.

Keshab .R. Bhattarai (University of Hull, 2004), carried out a research on OECD economies using a paneled data and found out that the Phillips curve phenomenon is empirically significant in countries such as Britain, Denmark, Italy, Norway, Netherlands, New Zealand and the USA.

Ola- David and Oluwatobi (2012) investigated the existence of an Okun-type relationship for the Nigerian economy during the period 1970 to 2009. The results showed that a long run inverse relationship exists between unemployment and output in Nigeria. The Okun coefficient was 1.75 percent indicating that a one percent decrease in unemployment rate is accompanied by a 1.75 percent increase in GDP.

Methodology

Research Design

Research design refers to the plan or blueprint on how the research process will be carried out. There are different types of research designs, thus experimentation, descriptive, explanatory and survey designs. This study adopts the descriptive research design and trend analysis.

Data required

The data needed for this research work are essentially secondary data. The needed data for this research project include; data on inflation rate, data on government expenditure, data on interest rate and data on unemployment rate and data on gross domestic product. The data covered the period of 1985-2015.

Source of Data

The annual time series data will be gotten from the Central Bank Nigeria Bulletin, National Bureau of Statistics Bulletin, covering a period of Thirty (30) years that is, 1985 to 2015.

Method of Data Analysis

The Ordinary Least Square (OLS) technique of data analysis and descriptive statistics will be used. It will be reached by using the statistic parameters to estimate the meaningful test result. The use of economic theories in evaluating the result, the coefficient of correlation and standard error estimate will feature in the analysis.

Specification of the Model

A model is an attraction from reality. A simplified system used to stimulate some aspects of real economy. Economics is bound to use simplified models; the real economy is so large and complicated that it cannot be fully described in finite time or space (Koutsoyiannis, 1977). A good model concentrates on the point it is studying and leaves out anything not essential to it. Models vary between the very simple, for example, the IS-LM model, and large econometric models with thousands of equations. The results of any change in the assumptions of an economic model can be worked out, either by theory or numerical calculation; whether the results generalize to the real world can only be formed out of experience. If the model-builders have picked the right aspects of reality to include in their models, there will be some approximate resemblance between the models predictions and the real economy. From the forgoing analysis, the model can be written in its functional form as follows:

UNEMP	=	$f(\text{INF, GEXP, INTR, GDP})$ Where
UNEMP	=	unemployment Rate
INF	=	Inflation Rate
GEXP	=	Government Expenditure
INTR	=	Interest Rate
GDP	=	Gross domestic product
f	=	Functional relationship

Expanding the model into linear mathematical relationships, we have:

$$\text{UNEMP} = a_0 + a_1 \text{INF} + a_2 \text{GEXP} + a_3 \text{INTR} + a_4 \text{GDP} + \text{et}$$

However, our econometric model is yet to be complete. We complete our econometric model by including the stochastic error term (et). Thus our model specification becomes:

$$\text{UNEMP} = a_0 + a_1 \text{INF} + a_2 \text{GEXP} + a_3 \text{INTR} + a_4 \text{GDP} + \text{et}$$

Where

a_0 is the intercept depicting unemployment when explanatory variables are equal to zero.

a_1, a_2, a_3, a_4 are the coefficients or parameters attached to the explanatory variables. The inclusion of stochastic or error term (et) in the above model is to capture the impact of other variables that are not included in the models.

Justification of the Technique

The procedure of estimation adopted for this study is the classical linear Regression Model and using the Ordinary Least Square (OLS) as an estimator because it has best, linear, unbiased Estimator (BLUE). Another reason being that its computational procedure is fairly simple compared to other econometric techniques. Then the computer software used to obtain the result will be E-Views7 statistical package to determine the relationship between the variables. Also statistic parameters are used to estimate the meaningful results.

Data Presentations

The essence of chapter four is to present and analyzed data. In this work, the data presentation and analysis is divided into trend analysis; descriptive statistics; Unit root test, the ordinary least squares (OLS) and some OLS residual tests like test for autocorrelation, normality and heteroskedasticity.

Table 1: Data Presentation

Year	UNEMP (%)	INF (%)	GEXP	INTR (%)	RGDP
1985	6.7	4.7	13041.1	-1.6	134585
1986	8.5	20.9	16223.7	-1.5	134603
1987	5.3	7.9	22019	-31.9	193126
1988	5.8	23.2	27749.5	-5.1	263294
1989	5.8	40.7	41028.3	-17	382261
1990	5.2	4.7	60268.2	14	472648
1991	5.8	5.4	66584.4	2.1	545672
1992	6.7	10.2	92797.4	-25.8	875342
1993	6	56	191228.9	4.4	1089680
1994	5.4	50.5	160893.2	-8	1399703
1995	4.1	7.5	248768.1	-43.6	2907358
1996	4.1	12.7	337417.6	-9.7	4032300

1997	4.1	44.8	428215.2	16	4189250
1998	4.1	57.2	487113.4	25.3	3989450
1999	4.1	72.9	947690	2.8	4679212
2000	4.1	29.3	701050.9	10.3	6713575
2001	4.1	8.5	1017997	23.8	6895198
2002	4.1	10	1018178	-10.8	7798758
2003	4.1	6.6	1225988	8.6	9913518
2004	4.1	6.9	1384000	19.4	11411067
2005	4.1	18,9	1465388	3.3	14610881
2006	4.1	12.9	1809702	12.4	18564595
2007	4.1	8.2	2348593	11.6	20657318
2008	15.7	11.6	3078300	4.2	24296329
2009	12.4	13.7	3280770	23.7	24794239
2010	10.5	12.5	3993310	14.9	33984754
2011	8.9	13	4232990	16.02	37409861
2012	8.6	13	4200000	15.18	40544100
2013	8.4	12.4	4797470	11.66	83520000
2014	15.7	10.3	5211420	12.4	87905678
2015	16.8	9.3	6222323	14.7	98567890

Source: CBN Statistical Bulletin 2014

Model Estimation

By trend analysis, we intend to describe the recent trends in the macroeconomic aggregates used in the model as variables. This is important to draw some necessary inferences as to the final outcome of the regression model. The main variables used in this model include; UNEMP; INF; GEXP; INTR and RGDP.

From the graphs five depicting the various trends in the variables below, it can be seen that the growth of the dependent variable UNEMP correspond to the growth in three independent variables of INF, GEXP and RGDP while the growth in INTR had different periods of fluctuations. The similar trends exhibited by the dependent variable and some of the independent variables are as a result of the close association and dependency of the variables on one another. During a period of sustained unemployment in an economy, the total productive capacity is negatively affected hence the level of RGDP and GEXP are directly affected while INF is indirectly affected. INTR has no direct relationship with the dependent variable as exhibited by graph depicting INTR fluctuations. All the graphs are presented below:

Descriptive Statistical Analysis Table 2 Descriptive Statistics

	UNEMP	INF	GEXP	INTR	RGDP
Mean	6.822581	19.88387	1584791.	3.605161	17834718
Median	5.400000	12.50000	947690.0	8.600000	6713575.
Maximum	16.80000	72.90000	6222323.	25.30000	98567890
Minimum	4.100000	4.700000	13041.10	-13.60000	134585.0
Std. Dev.	3.749463	18.24610	1837352.	16.44772	26716509

Skewness	1.518433	1.528123	1.071590	-1.137304	1.968886
Kurtosis	4.227859	4.149054	2.866227	3.918923	5.869676
Jarque-Bera	13.85983	13.77041	5.956027	7.773584	30.66557
Probability	0.000978	0.001023	0.050894	0.020511	0.000000
Sum	211.5000	616.4000	49128518	111.7600	5.53E+08
Sum Sq. Dev.	421.7542	9987.602	1.01E+14	8115.826	2.14E+16
Observations	31	31	31	31	31

Source: Author's Computation using Eviews 8.0

In Table 2 above, it can be seen that the mean - median ratio is close to unit proximity. This implies that when plotted the normal distribution curve, both the mean and median will cluster together. The range (maximum and minimum) is positive indicating that the data set used for analysis is dominated by positive values.

Skewness of the distribution shows all the variables except INTR to be positively skewed while INTR is negatively skewed. This also confirms that fact that the frequency distribution of the data is dominated by positive values. Kurtosis of the distribution shows that only INTR that satisfied its expected condition of three (3). The distribution of GEXP is less than three indicating that the distribution is peaky. UNEMP, INF and RGDP are more than three indications that the series are flat but not far from three.

The Jarque-Bera test for normality shows that the data series are all normally distributed with significant probabilities at 5% level of confidence. This gives confidence to the nature of regression result that we will come from this study.

Unit Root Test

Table 3 ADF Unit Root Test at Levels

Variables	ADF values at levels	Mackinon values 5%	Order of integration
UNEMP	-1.205025	-2.963972	Not stationary
INF	-3.735147	-2.967767	1(0)
GEXP	4.453376	-2.963972	1(0)
INTR	-3.833390	-2.963972	1(0)
RGDP	3.825023	-2.991878	1(0)

Source: Author's Computation using Eviews 8.0

The ADF unit root test at levels as contained in Table 3 above shows four of the series INF, GEXP INTR and RGDP to be stationary at levels while the dependent variable UNEMP is not stationary at levels. This shows no integration of the data series hence the test at 1st difference is required. This decision is arrived at when the ADF critical values are compared with Mackinon values at 5% level of significance. The ADF test at 1st difference is displayed in table 4 below:

Table 4 ADF Unit Root Test at 1st Difference

Variables	ADF values at levels	Mackinon values 5%	Order of Integration
D(UNEMP)	-6.011688	-2.967767	1(1)

D(INF)	-5.650885	-2.971853	1(1)
D(GEXP)	-9.967443	-2.971853	1(1)
D(INTR)	-7.650624	-2.971853	1(1)
D(RGDP)	6.216368	-2.998064	1(1)

Source: Author's Computation using Eviews 8.0

The ADF unit root test at 1st difference as contained in Table 4 above shows all the series UNEMP, INF, GEXP, INTR and RGDP to become stationary at 1st difference with the same order integration. This decision is arrived at when the ADF critical values are compared with Mackinnon values at 5% level of significance. The ADF test at 1st difference shows short and long run relationship. We shall use the OLS to show only the short run relationship.

OLS Result Analysis

Table 5 OLS Regression Result

Dependent Variable: UNEMP

Method: Least Squares

Date: 06/04/16 Time: 19:05

Sample (adjusted): 1986 2015

Included observations: 31 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
INF	-0.091577	0.024437	-3.747479	0.0009
GEXP	3.24E-06	9.11E-07	3.560797	0.0014
INTR	0.086593	0.042531	2.035982	0.0517
RGDP	-4.44E-08	6.47E-08	-0.686589	0.4982
R-squared	0.680335	Mean dependent var		6.822581
Adjusted R-squared	0.600372	S.D. dependent var		3.749463
S.E. of regression	3.352842	Akaike info criterion		5.377408
Sum squared resid	303.5219	Schwarz criterion		5.562439
Log likelihood	-79.34983	Hannan-Quinn criter.		5.437723
Durbin- Watson stat	1.994932			

Source: Author's Computation using Eviews 8.0

Table 5 above contains the OLS result. The result shows a negative relationship between INF and RGDP and UNEMP in Nigeria. The UNEMP and INF is a confirmation of the inverse relationship between the variables as exhibited by the Philips Curve. The negative relationship between RGDP and UNEMP is also a confirmation of the Okun's law. This is quite consistent with a priori expectation set up before data analysis.

The R and adjusted R have all indicated the model to have a good fit. The value of 68% shows that independent variables in the model have explained 68% of variations in the dependent variable, leaving 32% to the stochastic error term for the factors not explicitly captured in the model. The Durbin -Watson of 1.9 shows positive serial correlation but within a normal and acceptable bound of 2. INTR and GEXP However, have positive relationship with the dependent variable. There is no economic justification to justify these variables especially INTR has no direct relationship and effect on UNEMP.

Granger Causality

One of the objectives of this study was to examine the causal effect between inflation and unemployment in Nigeria. To achieve this, the Granger causality test is used. The result is displayed in Table 6 below:

Table 6 Pairwise Granger Causality Test

Pairwise Granger Causality Tests

Date: 07/05/16 Time: 14:34

Sample: 1985 2015

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
INF does not Granger Cause UNEMP	29	0.71299	0.0003
UNEMP does not Granger Cause INF		0.75012	0.0431
GEXP does not Granger Cause UNEMP	29	6.77704	0.0046
UNEMP does not Granger Cause GEXP		0.46612	0.6330
INTR does not Granger Cause UNEMP	29	0.63050	0.5409
UNEMP does not Granger Cause INTR		0.33569	0.7182
RGDP does not Granger Cause UNEMP	29	9.28861	0.0010
UNEMP does not Granger Cause RGDP		1.06057	0.0319

Source: Author's Computation using Eviews 8.0

The Pairwise granger causality test shows a bi-directional causality between INF and UNEMP; RGDP and UNEMP. This is also statistically significant at 5% level of confidence. The test shows a uni-directional causality running from *GEXP* to UNEMP and zero causality between INTR and UNEMP. This also confirms the relationship between unemployment and inflation in Nigeria during the period of analysis.

OLS Residual Tests

To examine the stochastic assumptions of the OLS, we require some residual tests. The following are some of such residual. The figure above shows OLS normality test with the distribution having a symmetrical bell shape consistent with the normal curve. The probability values also confirm normality with a significant probability significant at 5% level of confidence. On the above premise, we can conclude that the data set used for this analysis is not far from normal distribution. This was also seen from the descriptive statistic earlier conducted in section 2 Normal distribution is therefore seen in modern day research as an important factor in validating the entire result of the research.

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	3.645433	Prob. F(2,25)	0.0408
Obs*R-squared	4.463078	Prob. Chi-Square(2)	0.0174

Source: Author's Computation using Eviews 8.0

The test for autocorrelation indicates no autocorrelation for the distribution has significant probabilities values significant at 5% level of confidence. The null hypothesis of no autocorrelation is accepted at 5% confidence level.

The test for heteroskedasticity is also accepted at 10% due to the significance values of the probabilities at 10% level of significance.

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.391949	Prob. F(4,26)	0.0125
Obs*R-squared	1.762988	Prob. Chi-Square(4)	0.0792
Scaled explained SS	1.127676	Prob. Chi-Square(4)	0.0899

Source: Author's Computation using Eviews 8.0

Test of Hypothesis

1. H_0 : There is no significant relationship between inflation and unemployment in Nigeria. To test for the hypothesis, the OLS result is used. The OLS result shows a negative but significant relationship between inflation and unemployment in Nigeria, significant at 10%, 5% and 1% confidence level. This gives an easy decision to reject the null hypothesis of no significant relationship between inflation and unemployment in Nigeria. We thus accept the alternative hypothesis of a significant relationship between the variables.
2. H_0 : There is no significant relationship between government expenditure and unemployment in Nigeria. To test for the hypothesis, again the OLS result is used. The OLS result shows a positive and significant relationship between government expenditure and unemployment in Nigeria during the period of analysis and is significant at 10%, 5% and 1% confidence level. This gives an easy decision to reject the null hypothesis of no significant relationship between government expenditure and unemployment in Nigeria. We thus accept the alternative hypothesis of a significant relationship between these variables.
3. There is no causal links between inflation and unemployment. To test this hypothesis, the Pairwise granger causality test is used. The test shows a statistically significant bi-directional causality between INF and UNEMP in Nigeria. We again reject the null hypothesis of no causality between inflation and unemployment in Nigeria. We thus accept the alternative hypothesis of a significant causal relationship between these variables.

Summary

In this research, the author aimed at examining the relationship between inflation and unemployment in Nigeria between 1985 and 2015 making use of the Ordinary Least Squares (OLS) supplemented by residual tests and descriptive and trend analysis and unit root test. The result from OLS confirms the existence of a negative relationship between inflation and economic growth in Nigeria and a positive relationship between government expenditure and unemployment in Nigeria. The relationship was statistically significant at 1% level of significance.

Decision on the null hypotheses formulated on the basis of OLS and granger causality test, were rejected as in fact there existed a significant relationship between the independent variables of INF and GEXP and UNEMP in Nigeria during the time frame of 1985 and 2015.

Conclusions

The OLS empirical result confirms the existence of a negative relationship between inflation and unemployment in Nigeria and is consistent with a priori expectation and the A. W. Philips curve. RGDP and GEXP however hold the potentials for reducing unemployment in Nigeria. From the result, if RGDP increases unemployment will reduce and vice versa. It beholds result, if RGDP increases unemployment will reduce and vice versa. It beholds on our authorities to introduce economic policies aimed sustaining RGDP growth rate for effective employment creation.

Recommendations

- i. Government must as a deliberate policy create more employment opportunities for the citizens of Nigeria. This can be done by diversifying the industrial and agricultural sectors in Nigeria.
- ii. The National Directorate of Employment should be strengthening for effective entrepreneurship training for employment creation in Nigeria. So far, the directorate seems to lack the needed financial and administrative capacity for training and empowerment.
- iii. Government has to encourage the growth of private sector as the engine of growth. The private sector presently holds more prospects for employment generation in Nigeria than the public sector.
- iv. The authorities are required to introduce economic policies aimed sustaining RGDP growth rate for effective employment creation in Nigeria.

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