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The Nigerian Real sector and Unemployment Probabilities

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Abstract: As observed in Nigeria presently, both the Gross Domestic Product (GDP) and unemployment rates are increasing simultaneously. This occurrence however, invalidates the existence of Okun's Law in Nigeria. In the same vein, Nigerians output could as well be more capital intensive to labour intensive. This research work sets out to finding the reason for the violation of Okun's Law in Nigeria. Using Weighted Grouped Logit Distributed lag model (WGLDL) with quarterly series from 1991 to 2012. Present quarter and last-two quarter unemployment rates are negatively related with the present quarter Real Gross Domestic Product of Nigeria. The immediate past quarter unemployment rate is positively related with the present quarter Real Gross Domestic Product by approximately 16 units rise in RGDP for a unit rise in the immediate past quarter unemployment rate. This is a result of behavioural habits of employees; when people are retrenched from their jobs last quarter, the efficiency, effectiveness, and output/productivity of the remaining workers increase indefinitely as the means to retain their jobs in the midst of the fear and job insecurity that have enveloped them. This they do on the axiom that the less or least effective and efficient workers were retrenched last quarter. Consequently, a positive relationship. Empirically, the probabilities that the national output will fall for every raise per quarter unemployment rates diminishes and tends to zero. Simply put, the failure that unemployment will result to reductions in the national output is almost certain (tends to one). In the same light, change in probability also tends to zero as unemployment rates in Nigeria increases. This therefore suggests, holding every other thing constant, increase in unemployment rates in Nigeria will probably not affect or reduce our National output.
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JEL Classification: E24, J64, D2, and E2.

INTRODUCTION

As observed that the number of human resources (labour) who are legally qualified, available, able and willing to work in Nigeria is geometrically increasing each year, as Tertiary institutions graduate students each academic year, greater percentage of these graduates; are assumed or believed to be employable. There isn't enough employment creation and/or opportunities to meet up with this increasing number of employable graduates. However, it is ironical, paradoxically speaking, in the face of this increase in the number of unemployed human resources, the Nigerian economic output is also increasing. Could it be that the Nigerian economy does not conform to economic theories, is it that Nigerian employed labour is more efficient to increase aggregate output without a significant increase in the number of employed human resources, is Nigeria substituting capital for labour? Moreover, all the human resources in an economy cannot be optimally utilized. Consequently, when an economy optimally utilizes the "available resources", then the economy is said to be operating at full employment of the resources. This suggests that there exist a "natural" or non-market rate of unemployment, termed the Natural rate of unemployment.

As the number of unemployed youths increases in an economy, so is the increase in crimes. It is said that an idle man is a devils workshop. This adage had been proven true over time. Imagine the present state of poverty in Nigeria, even in the face of our Rebased Gross Domestic Product, many poor families trade off expenses on basic necessities of life like food, clothe, shelter, etc. for training one of more the brilliant and intelligent ones in school. This is done on the belief that they, the ones trained in universities, will be the pillar(s) of the family tomorrow. Many of these families have been disappointed and some doubt the possibilities of the graduates of the family, being the pillar of the family because of the problem of unemployment.

Crime rates on the other hand also increases as many employable youths are idle, doing nothing and yet faced with the fact that they must eat food and drink water as well as pay bills, get basic things of life. What more can an unemployed youth do to attain these things if not to think of an easy way out?

In the graph below, it is obvious that in the early 70's the unemployment rate has a flatter positive slope and at a point, the slop became stepper. It got to its pick around 1975 and started decreasing at a fluctuating rate. Lately, after 2010, there exist a sharp increase with a nearly perfectly inelastic slope till date. From 11.65 in 2010 to 23.9 in 2011 and then to 27.07 in 2012.

Fig-1.1: Nigerian National Unemployment Rate (1970 - 2012)
Source: Researchers' computation

Asnake [1] lamented that despite the early recognition given to unemployment issues, their explosive growth rate and economy wide impact over the past three decades remain one of the key set challenges affecting Nigeria today. Apart from being waste of man power resources, unemployment generates welfare loss in terms of lower output thereby translating into lower income and well-being [2, 3]. Fadayomi *et al*. [4], found out that one of the causes of high unemployment is inability to develop and utilize the nations manpower resources effectively especially in rural areas. This, however, resulted in a high rate of youth migration to urban areas seeking to participate in commercial activities and other activities, thereby leaving agriculture to the aged [5].

If we take a look at the nature of employment in Nigeria, there seems to be a dispersion in the level of employment with respect to sex, region, state, sectors, etc. which makes it look as if one's efficiency do no longer determines his/her employment but his gender, state, etc. one can pose that, the unemployed human resources is not normally distributed in the thirty-six states of Nigeria, considering the distribution of Nigerian employment by sex, agriculture, forestry, farming, manufacturing, construction, wholesale or retail trade, repair of automobile, education, health, social works, administration, support service activities, etc.
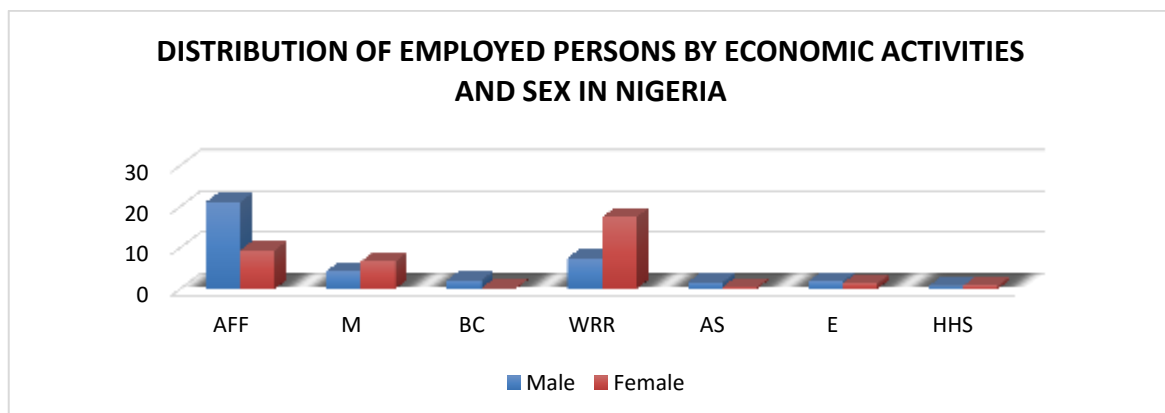

Fig-1.2: Employment Distribution by Economic Activity And Sex
AFF = Agriculture, Forestry & farming. M = Manufacturing. BC = Building & Construction.
WRR = Wholesale, Retail trade & Repair. AS = Administration & Support. E = Education.
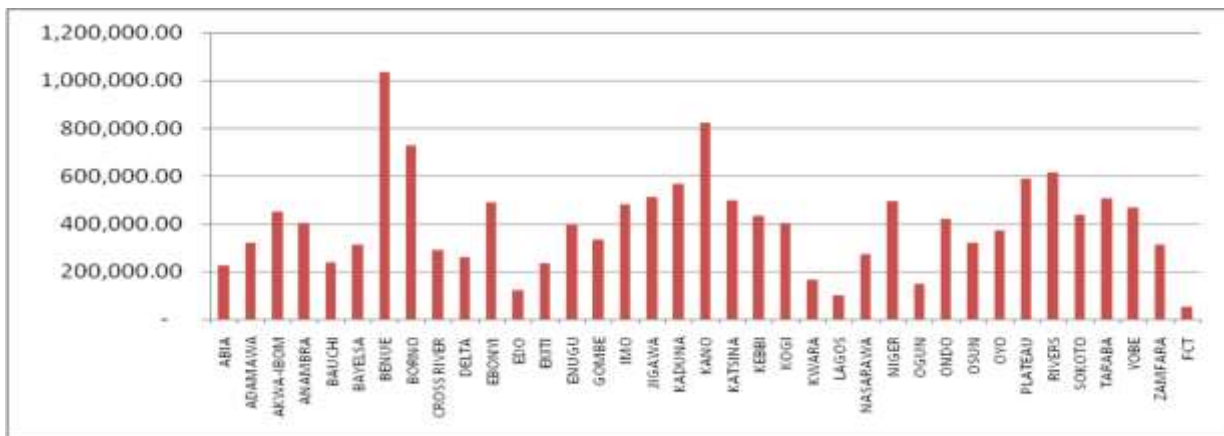HHS = Ihuman, Health & Work.

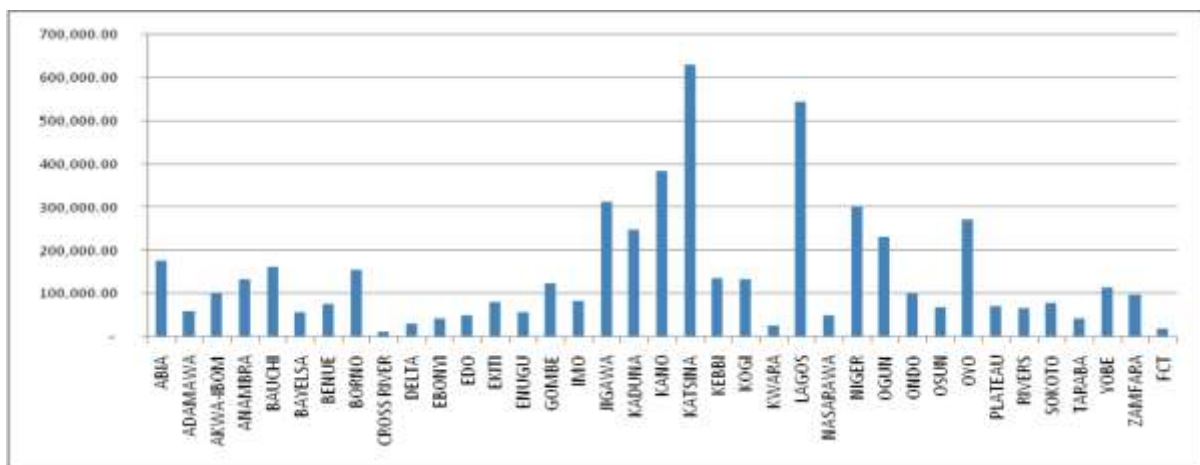**Fig-1.3: Distribution of Employed Persons by Agriculture, forestry & Farming**

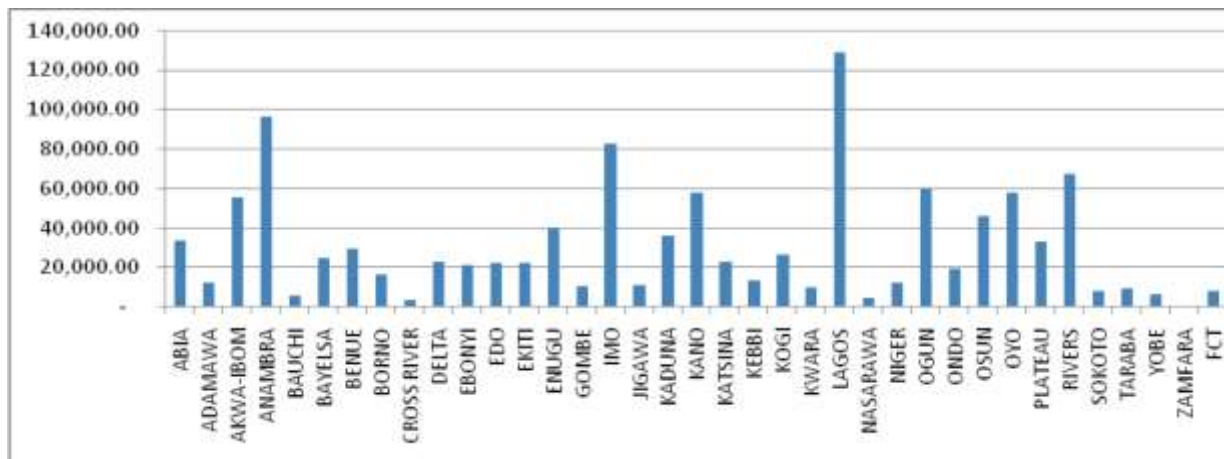**Fig-1.4: Distribution of Employed Persons by Manufacturing and by State**

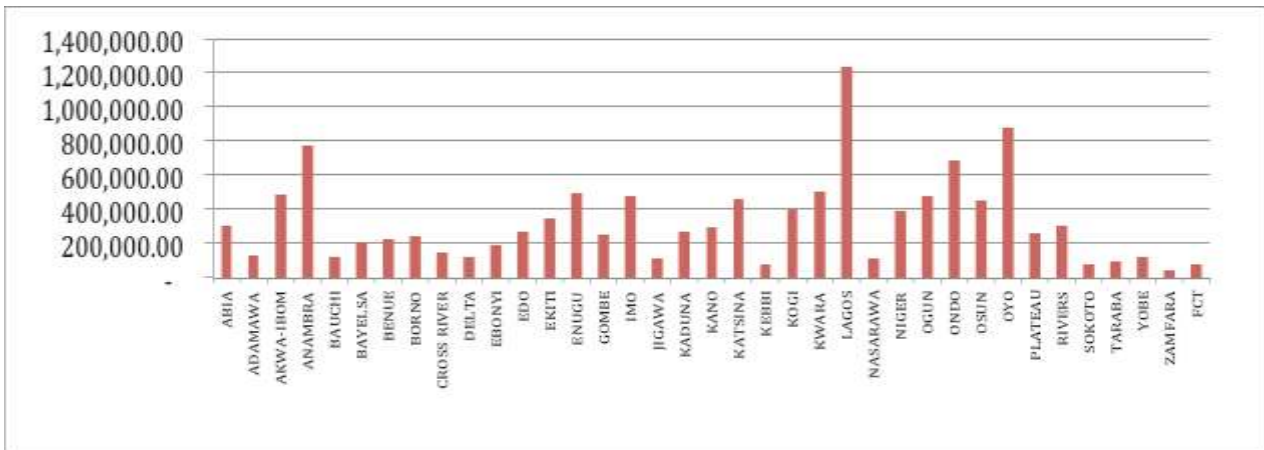**Fig-1.5: Distribution of Employed Persons by construction and by State**

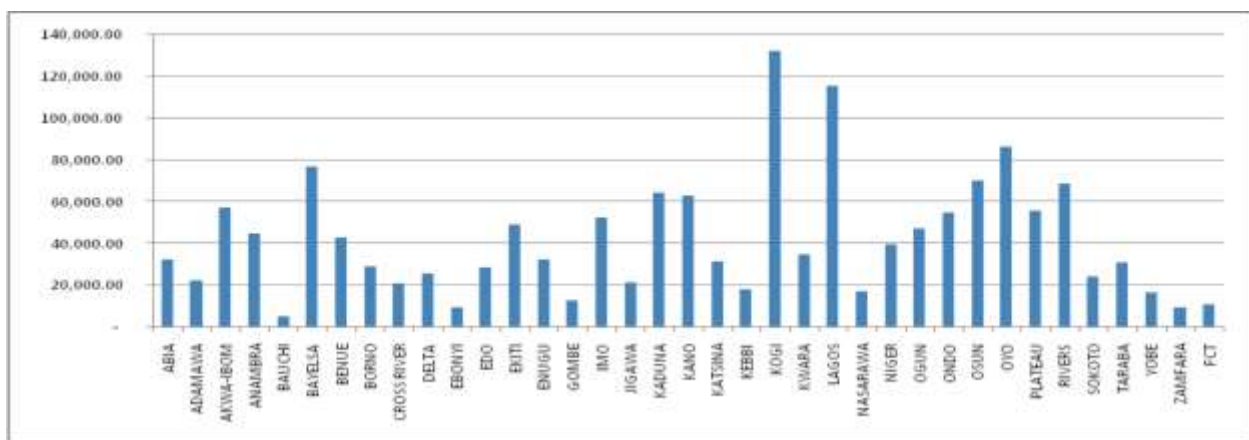**Fig-1.6: Distribution of Employed Persons by wholesale, Retail Trade & Repair**

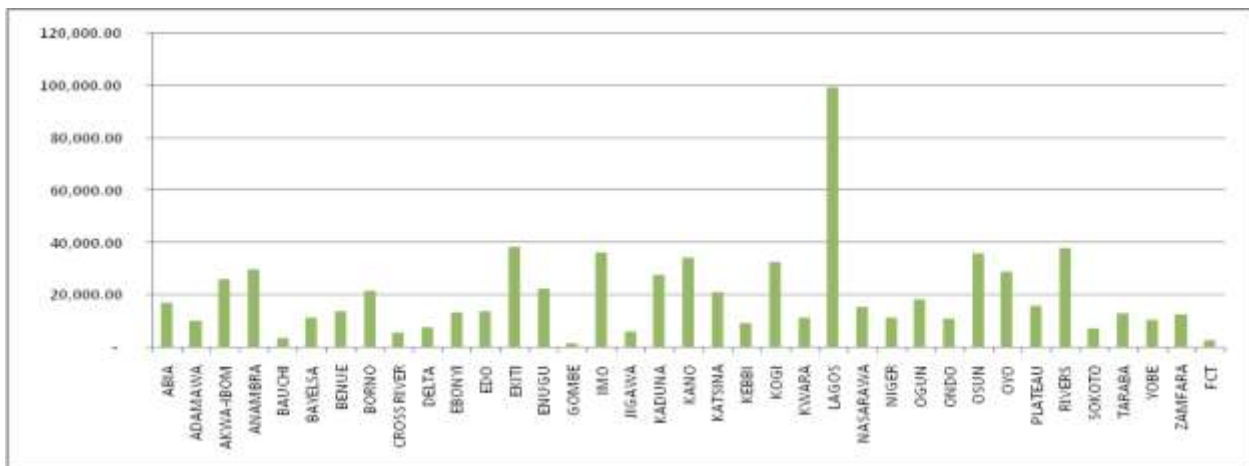**Fig-1.7: Distribution of Employed Persons by Education and by State**

Fig-1.8: Distribution of Employed Persons by Human, Health & Social works
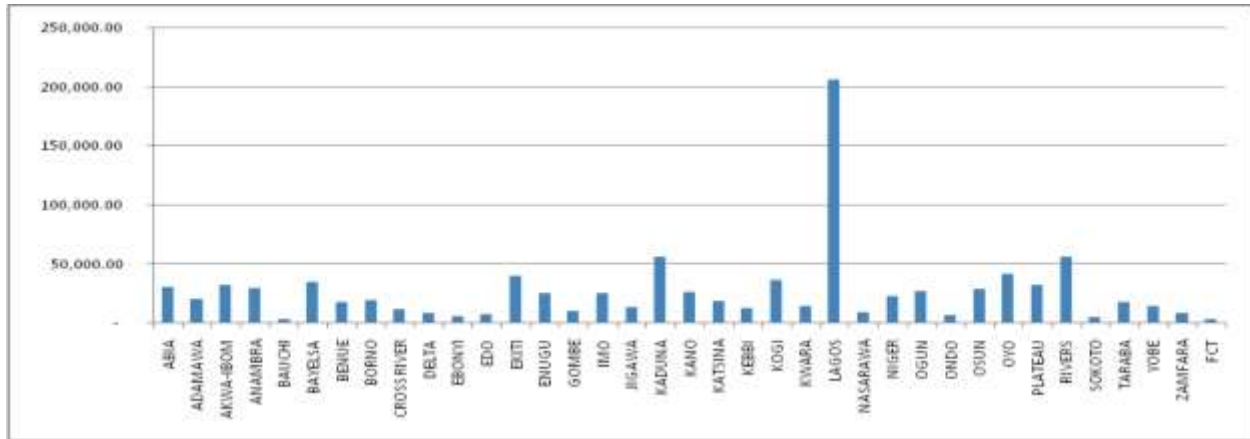
Fig-1.9: Distribution of Employed Persons by Administration & Support Services
Source: NBS National Manpower Stock and Employment General Survey.

The charts have validated the distribution of employment/unemployment in the thirty-six states of Nigeria plus the FCT is unequal. It is obvious that in the various sectors considered, no one state has the heights employment.

Therefore, the Lorenz curve will help to illustrate the uniformity of the distribution of employment in Nigeria. For simplicity sake, we will examine the employment level in the six Geo-political Zones in Nigeria. They are North Central (Benue, Kogi, Kwara, Nasarawa, Niger, Plateau, and FCT, Abuja), North-Eastern (Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe), North-Western (Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara), South-East (Abia, Anambra, Ebonyi, Enugu, and Imo), South-South (Akwa-Ibom, Bayelsa, Cross River, Delta, Edo, and Rivers) and South-Western (Ekiti, Lagos, Ogun, Ondo, Osun, and Oyo) states. Below is the Lorenz Curve of the distribution of employment on the Agriculture, forestry and Farming in the Six geo-political States in Nigeria, in thousands of people.

It is important to note that, the closer the Lorenz curve is to the 45 degree bisector, the more the uniformity. 60% and 30% of the geo-political zones account for 50% and 28% of the total number of Agricultural labour employment in Nigeria respectively. This shows that the distribution of employment in the Agricultural sector of Nigeria is unequal with respect to the six Geo-political Zones. From the figures above, one can as well conclude an unequal distribution of employment on the other Area as shown in the charts. Furthermore, it is expedient in this work to consider unemployment over time in Nigeria.

The decision rule states, as GCR tends to zero; there is a high level of equality. As GCR tends to one; there is high level of inequality. To calculating the Gini Coefficient using the integration method, the function of the Lorenz curve is given as :

$$y = 1.028312x - 5.74309.$$

(**See Appendix1**)

Using the limits100 and 0 as upper and lower limits respectively. The area between the Lorenz curve and the perfect line of equality is given as:

$$\int_0^{100} 1.028312x - 5.74309 = 4567.5291.$$

On the order hand, the area of a right angle triangle is given as:

$$\frac{1}{2}b \times h = 5000. \; where \; b = h = 100.$$

Hence the GCR (Gini Coefficient Ratio) is the ratio of the area between the Lorenz Curve to the area of the right angled triangle, which gives:

$$4567.5291/5000 = 0.9135(4dp).$$

Empirically shown via the techniques of the Lorenz Curve, there is a very high inequality in the distribution of employment in the six geo political zones in Nigeria with coefficient as **0.91**. This however also suggest an inequality in the level of unemployment in the six geo political zones as some zone experience a very high significant unemployment rate while others don't experience such.

One could suggest that the inequality in employment among these zones could be a function of the unequal number of states in each zone. However, lets also calculate the GCR of the distribution of states amongst the six geopolitical zones using Princeton Angus Deaton .In 1912 Corrado Gini, an Italian statistician formulated the Gini coefficient or Gini index or Gini concentration ratio, named after him. It is empirically proven the Gini concentration ratio lies between one and zero. As GCR tends to one, the inequality is high and as it tends to zero, lower the

inequality and can neither be one nor zero, implying no perfect equality or inequality in real cases. GCR is generally the ratio of the area between the 45-degree line and the Lorenz curve to the area of half the rectangle. Princeton Angus Deaton (1997), a development economist redefined the Gini concentration ratio:

$$(GCR) = \frac{N+1}{N-1} - \frac{2}{N(N-1)u} \times \sum_{i=1}^{n} P_i X_i.$$

Where u is the mean of the number of states in the geopolitical zones, P is the rank of the number of states in the geopolitical zones and X, the number of states in each geopolitical zone. Thus the GCR of the Lorenz curve plotted above is,

$N=6$, $\sum_{i=1}^{n} P_i X_i = 123$ and $u = 6.17$.

It gives:

$$GCR = \frac{N+1}{N-1} - \frac{2}{N(N-1)u} \times \sum_{i=1}^{n} P_i X_i$$
$$= \frac{7}{5} - \frac{2}{6(5)(6.17)} \times (123)$$
$$\approx 0.071. \ (\textbf{See Appendix1})$$

This shows that empirically, there is near equality in the distribution of states on the six geopolitical zones of Nigeria, using the Agricultural sector as a case study.

It is however expected for Economist and policy makers to investigate into this issue in other to table explanations on the hearts of many, who are in dilemma about the rationale, behind the existence of this scenario in the Nigerian economy. The explanation to this problem will not just surface itself, but through extensive and qualitative researches, it will be made known, why the scenario.

TREND ANALYSIS OF PRODUCTIVITY (OUTPUT) IN NIGERIA
The centrality of continuous productivity improvement in advancing societal development has been well acknowledged in this literature. In spite of the general consensus on the importance of productivity, many nations have not paid serious attention to the level of productivity (output) in their economies. From Nigeria, evidence has shown that both the national and sectorial productivity measures have generally reflected a declining trend over the past three decades. Given the data limitation on factor productivity in Nigeria, our analysis is restricted to labour productivity. Gross productivity (i.e. GDP per worker) consistently rose between 1973 and 1977 as a result of the appreciable improvements in the level of economic activities immediately after the oil boom of 1973 and 1974 (www.onlinenigeria.com/economics).. More so, the motivation associated with Udoji salary award and the

consequent spread to the private sector also contributed to productivity (output) improvement during this period Obadan *et al.* [6]. Furthermore, the sectoral analysis clearly shows that productivity in the industrial and service sectors are higher than in the agricultural sector. The productivity in the former is more than three times higher than in the latter during this period. Ezenwe [7] also found that agricultural productivity was the least among the three sectors examined. Obadan [8] provided reasons for this low productivity which induces subsistence production, prevalence of redundant labour, low income and lack of proper training on agricultural issues.

In Nigeria, data have shown that unemployment and productivity (output) moved in opposite direction. For instance, between 1981 and 1990, periods of high rate of unemployment were associated with period of declining low productivity. There were suggestions that productivity and employment were correlated during this period as a result of the wide gap between unemployment and productivity between 1991 and 1996.The trend tends to suggest an inverse relationship between unemployment and productivity (output growth), thus supporting a positive relationship between employment growth and productivity.

Recently, Nigerian has been experiencing a rapid increase in gross domestic product along with an increase in unemployment rate. This contradicts Okun's law which states that gross domestic product and unemployment rate are negatively related. For the year 2010, the data for RGDP, NGDP and unemployment rate respectively are 775526.4(in millions), 29205783(in millions), and 11.65% while those of 2011 are 834161.8(in millions), 37543622(in millions) and 23.9% (CBN 2013 Statistical Bulletin and NBS Statistical Bulletin)

TREND ANALYSIS OF UNEMPLOYMENT IN NIGERIA
Unemployment has posed a great challenge to many countries both developed and developing countries. Lately, the incidence of unemployment in Nigeria has been deep and widespread, cutting across all facets of age groups, educational strata and geographical entities which need good policy to tackle this macroeconomic misalignment. For instance the unemployment rate in Nigeria rose from 4.3 percent in 1976 to 6.4 percent in 1980. Though some marginal decline was recorded between 1981 and 1986, the rates were relatively higher than what was obtained in the 1960s and 1970s. The unemployment rate oscillated between 5.3 and 6.4 percent during 1980 and 1985 periods. This was as a result of the lull in the economy during that period. The economic down-turn discourages new investment and forced government to impose restriction on importation. The import

restriction forced many companies to close down or retrench most of their workforce which increased unemployment. For example, the survey of manufacturing companies undertaken by the Manufacturers Association of Nigeria (MAN) showed that 61.0 percent of the companies surveyed were shut down for different periods of not less than three months while between 62.0 and 63.9 percent of them disengaged over 100 workers [9]. This made job placement for fresh school leavers to be exceedingly difficult. Government also placed embargo on employment from September 1981, though relaxed in some periods (November 1982). The Structural Adjustment Programme (SAP) which was adopted in 1986 had serious implication for short run unemployment rather than reducing it. Contrary to the expectation of SAP, unemployment rose from 5.3 percent in 1986 to 7.0 percent in 1987. This was as a result of organizational down-sizing, re-engineering and rationalization policies which came with introduction of

SAP especially, the private sector. Umo [10] pointed out that an annual average of about 2.8 million fresh graduates enters the Nigerian labour market with only 10 percent getting employment. This shows that unemployment is a very serious problem in Nigeria. It fell consistently from 7.0 percent in 1987 to 3.1 percent in 1991 though there was a rise in 1992 to 3.4 percent.

However, unemployment rate in Nigeria has recently been on a sharp and rapid increase. It was 8.57% in 2007. This was good and as planned to maintain a single digit unemployment rate. It appears that in 2008, Nigeria lost track of this plan or goal and at the end of the year, we experienced 11.93% unemployment rate. It is surprising that all efforts made to reduce this devil in the society proved abortive and instead, it revolved around 11% until 2011, when it increased to 23.90% and in 2012, it rose further to 27.07%. Could it be that our economy has gone beyond repair? Show in the multiple Bar Chart below:
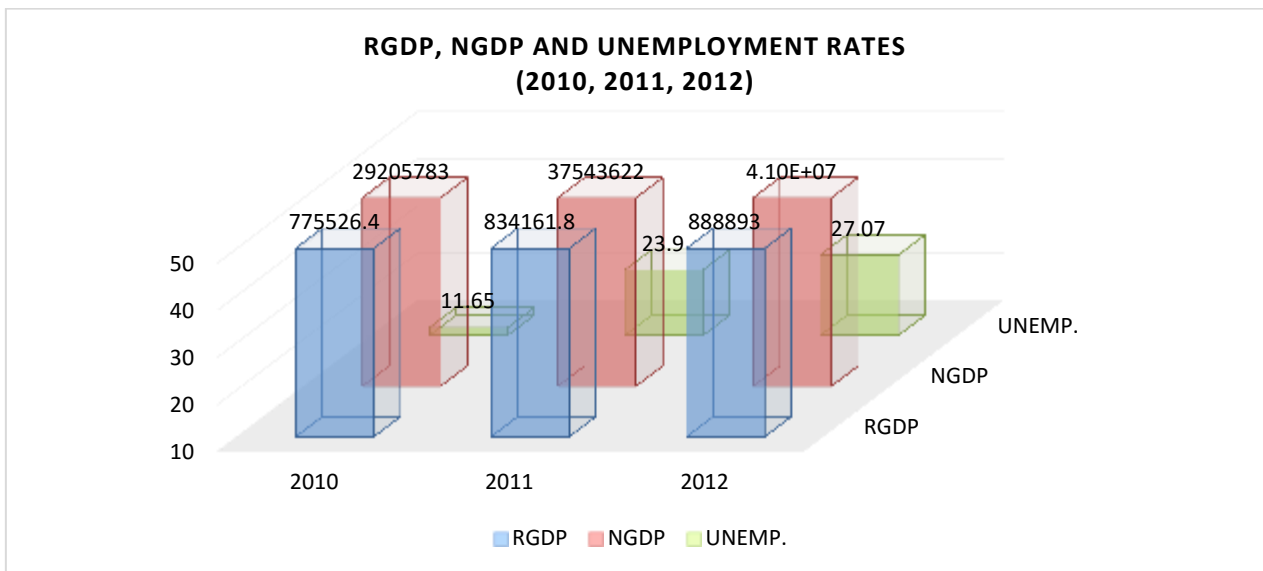

FIGURE 1.10 RECENT FIGURES OF RGDP, NGDP, & UNEMPLOYMENT RATES
Source: Researchers' computation

THEORETICAL LITERATURE
OKUN'S LAW

This theory or law was named after the economist that propounded the theory, Arthur Melvin Okun (1962). Was born in November 1928 and passed away in March 1980 at the relatively young age of 51 He proposed that the relationship relating unemployment to losses in a country's production. Empirically, it has been proven to be true. Hence there are two different versions of the Okun's law, which emanated from empirical works. The GAP VERSION states that for every unit percent change in the unemployment rate, a country's GDP will be roughly have an inverse change of about two percent change in its potential GDP. The DIFFERENCE VERSION describes the relationship between quarterly changes in unemployment and quarterly changes in REAL GDP.

This law is more often called Okun's rule of thumb. This is because it is basically an empirical study instead of a theory. Okun drew this conclusion after the first empirical work that validated this theory: 2% increase in output corresponds to a 1% decline in the rate of cyclical unemployment; a .5% increase in labor force participation; a .5% increase in hours worked per employee; and a 1% increase in output per hours worked (labour productivity). The relationship has been tested by regressing GDP or GNP growth on change in the unemployment rate. He also specified reasons why GDP changes more than a proportional change in unemployment: a reduction in the multiplier effect created by the circulation of money from employees, unemployed persons may drop out of the labour force (stop seeking work), after which they are no longer

counted in unemployment statistics, employed workers may work shorter hours, labour productivity may decrease, perhaps because employers retain more workers than they need, etc.

As established by Okun that unemployment has a negative significant relationship with economic output. The mathematical model of okuns law **(gap version)** may be written (Abel & Bernanke 2005) as:

$$(\overline{Y} - Y)/\overline{Y} = c(u - \overline{u}),$$

Where $\overline{Y}$ is potential GDP; Y is actual output; $\overline{u}$ is the natural rate of unemployment; u is actual unemployment rate and c is the factor relating changes in unemployment to changes in output. The gap version of Okun's law, as shown above, is difficult to use in practice because $\overline{Y}$ and $\overline{u}$ can only be estimated, not measured. A more commonly used form of Okun's law, known as the **difference or growth rate form** of Okun's law, relates changes in output to changes in unemployment:

$$\Delta Y/Y = k - c\Delta u,$$

Where: Y and c are as defined above; ΔY is the change in actual output from one year to the next; Δu is the change in actual unemployment from one year to the next; k is the average annual growth rate of full-employment output.

EFFICIENCY WAGE THEORY

This is a microeconomic approach of explaining unemployment. The rationale behind this theory is as follow: Assume that workers differ in quality, not just abilities but in the probability to shrink, i.e., some people are lazier than others and are therefore less likely to work harder, and effort is a function of cost monitoring (An employer cares about the cost of labour (the wage rate)). However, the cost is dependent upon productivity of the workers. So the objective is not to minimize the wage but the wage divided by productivity (wage per unit produced). Hence, there is a connection between quality of workers and wage rate. The higher the wage rate, higher the productivity, costlier it is to be fired and the less likely is it that the workers shrink (unemployment). Another argument using the same reason is; the exercise itself is costly (firing, hiring, and training) and consequently the employer would want to pay higher wages to prevent high quality workers from leaving.

THE REAL BUSINESS CYCLE THEORY.

It is argued in this theory [11] that the growth of productivity of input which revolutionizes technology is the main source of employment and unemployment. If the growth of output increases more than the growth of

inputs, then total factor productivity has increased. If total factor productivity is not growing, then the firms and the economy become insufficient. It follows that if reallocation of labor and capital cannot be achieved, labor and capital will be used in less profitable opportunities. However, when as a result of substituting more of capital with labour, there is employment while substituting labour with capital (technology), there is unemployment.

NEO-CLASSICAL THEORY OF ECONOMIC GROWTH:

We know that Hicks, J.E. Meade, Mrs. Joan Robinson, Solow and Prof. Swan are Neo-Classical economists. They have presented their growth models individually as Meade model (1961), Solow model (1956, 1960), Swan model (1956), and Mrs. Joan Robinson model (1956, 1999). Now we present all these models in a single model which we simply call Neo-Classical Model of Economic Growth, where we discuss the salient features of neo-classical theory and this model is called a reaction to H-D model. According to H-D model economy is always prey to instability. But according to Neo-Classical, if capital - output ratio is made flexible, the instability will come to an end. The basic Neo-Classical model assumes that in long run the constant - returns to scale applies and no technical progress takes place in the economy. The stock of capital can be adapted in capital intensive technology, more or less. It means that labor and capital are substitute table. Accordingly, by changing the capital labor ratio the equality can be brought in changes in labor, capital and output. This model also assumes that the factor prices are equal to their marginal productivities. Accordingly in this model, there exist flexibility of wages, prices and rate of interest. Whenever warranted growth rate exceeds natural growth rate the economy will cross the ceiling of full-employment. In such situation the labor saving technology will be used. As a result the capital-output ratio will increase. This will depress down the warranted growth rate till it becomes equal to natural growth rate. On the other hand, if warranted growth rate is lower than natural growth rate the excess amount of labor will emerge. As a result, real rate of interest will fall as compared with real wage rate. This will induce the firms to adopt labor intensive technology. In this way, the capital-output ratio will fall. This will lead to increase warranted growth rate (s/v) till it becomes equal to natural growth rate. According to neo-classical model because of changes in v and s/v the Harrodian instability and Raisor's Edge will not persist, and economy can attain a steady-state equilibrium. Its means to say that in neo-classical model the equilibrium growth rate coincides with dynamic disequilibrium where output, stock of capital, supply of labor and change investment, all will grow at the same exponential rate.

Thus according to neo-classical growth model, because of changes in capital-labor ratio and flexibility of wages, prices and interest rate the economy will attain a stable equilibrium.

CLASSICAL THEORY OF EMPLOYMENT

Classic economics covers a century and a half of economic teaching. Adam Smith wrote a classic book entitled, 'An Enquiry into the Nature and Causes of the Wealth of Nations' in 1776. Since the publication of that book, a body of classic economic theory was developed gradually. However, the classic theory owes its origin to the works of David Ricardo (1772 -1823), T. S. Mill, J. B. Say and finally ends with the works of A. C. Pigou (1877-1959). There is no one single theory which can be labeled as classical theory of employment. In fact the classical theory of employment is composed of different views of classical economists on the issue of income and employment in the economy. According to the classical economists, the economy normally operates at the level of full employment without inflation in the long period. They assumed that wages and prices of goods were flexible and the competitive market existed in the economy (laisse-fair economy). The classical model, however, did not rule out the existence of over production and hence temporary unemployment in the economy. According to classics, if market forces are allowed to operate in the economic system, they will eliminate over production and make the economy produce output at the level of full employment. The classical economists were of the view that when the economy was at full employment level, that did not mean nonexistence of unemployed workers. Even at full employment level, there would be workers who would be frictionally or voluntarily unemployed. In a normal situation, if prices and wages are assumed to adjust freely and quickly, then in the commodity and labor market, the economic system will operate at the level of full employment in the long run. Principles of Classical Theory of Employment:

The classical theory of employment is based on the following principles: Say's Law of Market. Equilibrium in the Labor Market. Classical Analysis of Price and Inflation.

KEYNESIAN THEORY OF INCOME AND EMPLOYMENT

John Maynard Keynes was the main critic of the classical macroeconomics. He in his book 'General Theory of Employment, Interest and Money' out-rightly rejected the Say's Law of Market that supply creates its own demand. He severely criticized A.C. Pigou's version that cuts in real wages help in promoting employment in the economy. He also opposed the idea that saving and investment can be brought about through changes in the rate of interest. In addition to this, the assumption of full employment in the economy is not realistic. So long as the economy was operating smoothly, the classical analysis of aggregate economy met no serious opposition. However, Great Depression of 1930's created problems of increasing unemployment, reducing national income, declining prices and failing firms increased in intensity. The classical model miserably failed to explain and provide a workable solution for how to escape the depression. It was at that time when J. M. Keynes wrote his famous book 'General Theory'. In it he presented an explanation of the Great Depression of 1930's and suggested measures for the solution. He also presented his own theory of income and employment. According to Keynes: "In the short period, level of national income and so of employment is determined by aggregate demand and aggregate supply in the country. The equilibrium of national income occurs where aggregate demand is equal to aggregate supply called effective demand which is the signification of the equilibrium between aggregate demand (C+I) and aggregate supply (C+S). This equilibrium position (effective demand) indicates that the entrepreneurs neither have a tendency to increase production nor a tendency to decrease production. It implies that the national income and employment which correspond to the effective demand are equilibrium levels of national income and employment. Unlike classical theory of income and employment, Keynesian theory of income and employment emphasizes that the equilibrium level of employment would not necessarily be full employment. It can be below or above the level of full employment. The determinants of effective demand and so of equilibrium level of national income and employment are the aggregate demand and aggregate supply. Aggregate Demand (C+l), this refers to the sum of expenditure, households, firms and the government is undertaking on consumption and investment in an economy. The aggregate demand price is the amount of money which the entrepreneurs expect to receive as a result of the sale of output produced by the employment of certain number of workers. An increase in the level of employment raises the expected proceeds and a decrease in the level of employment lowers it. The aggregate demand curve AD (C+I) would be positively sloping signifying that as the level of employment increases, the level of output also increases, thereby increasing of aggregate demand (C+l) for goods. The aggregate demand (C+l), thus, depends directly on the level of real national income and indirectly on the level of employment. Aggregate Supply (C+S), this refers to the flow of output produced by the employment of workers in an economy during a short period. In other words, the aggregate supply is the value of final output valued at factor cost. The aggregate supply price is the minimum amount of money which the entrepreneurs must receive to cover the costs of output produced by the employment of certain number of workers.

According to Keynes, the equilibrium levels of national income and employment are determined by the

interaction of aggregate demand curve (AD) and aggregate supply curve (AS). The equilibrium level of income determined by the equality of AD and AS does not necessarily indicate the full employment level. The equilibrium position between aggregate demand and aggregate supply can be below or above the level of full employment as is shown in the curve below.

PHILLIPS MODEL/CURVE

The Phillips curve is named after New Zealand–born economist A. W. Phillips. In 1958 Phillips observed a negative relationship between the unemployment rate and the rate of wage inflation in data for the United Kingdom. The Phillips curve that economists use today differs in three ways from the relationship Phillips examined. First, the modern Phillips curve substitutes price inflation for wage inflation. This difference is not crucial, because price inflation and wage inflation are closely related. In periods when wages are rising quickly, prices are rising quickly as well. Second, the modern Phillips curve includes expected inflation. This addition is due to the work of Milton Friedman and Edmund Phelps. In developing early versions of the imperfect information model in the 1960s, these two economists emphasized the importance of expectations for aggregate supply. Third, the modern Phillips curve includes supply shocks. Credit for this addition goes to OPEC, the Organization of Petroleum Exporting Countries. In the 1970s OPEC caused large increases in the world price of oil, which made economists more aware of the importance of shocks to aggregate supply.
Furthermore, phillips curve illustrates the relationship between unemployment and inflation has having a negative relationship. Using:

$$\pi t - \pi et = \beta 2 (\mathbf{UN}t - Un) + ut$$

Where: πt = actual inflation rate at time *t*; Πet = expected inflation rate at time *t*, the expectation being formed in year *(t − 1)*; UN*t* = actual unemployment rate prevailing at time *t*; *Un* = natural rate of unemployment at time *t* and *ut* = stochastic error term.

Phillips however assumed an adaptive expectation or error learning expectation approach in calculating the expected interest rate. The Adaptive expectation is stated thus:

$$X_t^* - X_{t-1}^* = \gamma(X_t - X_{t-1}^*)$$

Expanding the right hand side, we have
$$X_t^* - X_{t-1}^* = \gamma X_t - \gamma X_{t-1}^*$$

Collecting like terms
$$X_t^* = \gamma X_t - \gamma X_{t-1}^* + X_{t-1}^*$$
$$X_t^* = \gamma X_t + (1 - \gamma) X_{t-1}^* \dots \dots \dots \dots. equation\ (A)$$
$$X_t^* = expected\ value, X_t$$
$$= present\ Actual\ Value\ and\ \gamma$$
$$= Adaptive\ coefficient\ of\ expectation$$

Note $0 \leq \gamma \geq 1$

Phillips hence assume the adaptive coefficient of expectation to be zero (0), substituting this value in equation A, we have

$X_t^* = X_{t-1}^*$ As he used in his model.

EMPIRICAL EVIDENCE

A review of the existing descriptive analysis of the linkage between productivity (output) and unemployment shows some levels of variation. Also observed that growth of total employment maintained a positive relationship with real GDP in developing countries between 1960s and 1980s. Contrarily, Krugman [12] found no visible pattern among some developed countries between productivity and unemployment. Some countries with the best unemployment performances turned out to be the worst productivity performances.

Lawler, Katsouli and Pallis [13] estimated changes in cyclical unemployment and output in the EU using an okun's law equation. They used a state-space maximum likelihood estimation method which suggested that the extent and direction of changes of cyclical unemployment ant cyclical output over the period of 1966-1999 is mixed across the EU.

Castells-Quintana and Royuela [14] considered unemployment and income inequality as possible determinants of long run growth by using cross sectional international data. The result suggested that while initial high unemployment rate do not seem to be statistically significant to explain long run growth, but have a negative relationship.

Tatoglu [15] using poled data over the period of 1977-2008, found out that the relationship between economic output and unemployment varied among European countries. Mitchell [16] modelled unemployment rate in Australia as a non-linear function (LSTAR model) of unemployment and discovered that there is an inverse relationship between unemployment and aggregate demand. Al-Habees and Rumman [17] discovered a unidirectional causality from unemployment to economic growth in some Arab countries with detailed analysis in the case of Jordan.

Boussemart, Briec, Perman and Tavera [18] using a nonlinear version of okun's law augmented with technical change and technical distance, validated that the impact of output movement on unemployment variations is influenced by the imitation or innovation of technical changes. Sugihara [19] analyzed unemployment dynamics using logistic map. When unemployment rate changes, the first effect is a variation in the level of production. The second effect is a consecutive variation in the level of production caused

by variation in aggregate demand in consequence to the change of individual income originated by previous unemployment. Seyfried [20] estimated unemployment intensity of economic growth as well as the timing of the relationship between employment and economic growth. Employment intensity is estimated to range from 0.31-0.61.

Emily, Brent, and Tasci [21] the unemployment rate fell from 9.1 percent to 8.3 in 2011, but real GDP grew only 1.6 percent. That is much lower than its average growth of 2.6 percent since 1985. The slow GDP growth has led some observers to question how sustainable the recent improvement in the labor market is. Implicit in this suspicion is the idea that the unemployment rate can improve only so much given the modest growth of economic activity. This idea is based on an empirical relationship sometimes referred to as Okun's law, which is essentially a simple rule of thumb that associates the growth rate in real GDP to changes in the unemployment rate observed around the same time.

Estimates of Okun's coefficient are obtained using new estimates of cyclical GNP and cyclical unemployment rates for the post-war USA. Empirical estimates of the coefficient are near —0.25, somewhat smaller in magnitude than other recent estimates obtained applying similar econometric techniques to different estimates of cyclical output and unemployment. Tests fail to reject the hypothesis of parameter stability across an hypothesized break between the third and fourth quarters of 1973, suggesting similar relationships between cyclical output and unemployment both before and after the supply shocks of the 1970s [22].

Martin Prachowny [23] estimated about a 3% decrease in output for every 1% increase in the unemployment rate in poland. However, he argued that the majority of this change in output is actually due to changes in factors other than unemployment, such as capacity utilization and hours worked. Holding these other factors constant reduces the association between unemployment and GDP to around 0.7% for every 1% change in the unemployment rate [24]. The magnitude of the decrease seems to be declining over time in the United States. According to Andrew Abel and Ben Bernanke, estimates based on data from more recent years give about a 2% decrease in output for every 1% increase in unemployment [25].

Freeman [26] performed the ordinary least square (OLS) estimation of Okun's law in eight regional economics in the US defined by the Bureau of Economic Analysis and their results were compared, and it was observed that the absolute value of Okun coefficient was remarkably stable at about 1.9 to 2.0 for the overall economy for the entire period of 1958-1998

and the values for different regions were within a broader range, from 1.8 to 3.6, with a weighted average of 2.22. The results of the regional tests were however, in line with national estimates.

Aliero, Ibrahim and Shuaibu [27] using ARDL bound testing technique with data set from 1980-2011, found out that there has been a persistent unemployment in Nigeria while formal credit allocation in rural areas has short run and long run effect of reducing unemployment. They also found that expansionary monetary measures did not fuel inflation significantly.

Njoku and Ihugba [28], studying the relationship between unemployment and economic growth (1985-2009), found out that the economy grew by 55.5% between 1991 and 2006 and the population increased by 36.4% and unemployment increased by 74.8%. They also found out that the average contribution of the oil sector to GDP beween 1991 and 2006 is 30.5% while agriculture contributed 36.7%.

Sodipe and Ogunrinola [29] using OLS technique, found a positive relationship employment level and economic growth in Nigeria while a negative relationship was observed between employment growth and GDP growth.

Sodipe and Oluwatobi [30] investigated the existence of an okun type relationship for the Nigerian economy from 1970-2009 and found a long run inverse relationship between unemployment and output in Nigeria. They found a 1.75 okun coffecient.

Amassoma and Nwosa [31] utilized co-integration and error correction model approach although the unit root tests showed the variables were integrated of different orders, the johansen co-integration result showed that the variable were co-integrated.

Bakare [32] examined the implication of urban unemployment crisis on economic growth in Nigeria. Using OLS the found that urban unemployment crisis had a large negative significant impact on economic growth. Amogu [33] studying the relationship between inflation and unemployment and the applicability of the Phillips hypothesis in Nigeria, concludes that Phillips curve or hypothesis does not exist in Nigeria as inflation and unemployment in Nigeria are positively related using the ordinary least-square methods.

METHODOLOGY
This work will employ the Grouped Logit model and maximum likelihood estimation techniques. This is because of the ability of group logit model to forecast probability change given a unit change in the explanatory variable.

$$L_i = \alpha + \beta_i X_i \dots \dots \dots \dots \dots \dots (1)$$

Where $L_i = \ln(\frac{P_i}{1-P_i})$,

$P_i = \frac{RGDP_i}{GDP_i}$,

$\beta_i = [\beta_0 \quad \beta_1 \quad \beta_2]$ And

$$X_i = \begin{bmatrix} UNEMP_t \\ UNEMP_{t-1} \\ UNEMP_{t-2} \end{bmatrix}$$

It is important to note that β_i and X_i are row vector and column vector matrix of dimension Three. The Grouped Logit model, it is stated thus:

$$\frac{P_i}{} = \frac{1}{1 + e^{-(\alpha + \beta_0 UNEMP_t + \beta_1 UNEMP_{t-1} + \beta_2 UNEMP_{t-2})}} \dots (2)$$

$$P_i = \frac{1}{1 + e^{-(\alpha + \beta_i \sum_{i=0}^{n=2} UNEMP_{t-i})}} \dots (3)$$

Where $i = 0, 1, and\ 2$.

To correct the problem of Heteroscedasticity, because the $\mu_i \sim N\left[0, \frac{1}{N_i P_i(1-P_i)}\right]$, implying that the variance of the error term does not have a constant variance. We then use the Weighted Least-Square Grouped Logit Model, stated thus:

$$P_i\sqrt{W_j}$$
$$= \frac{1}{1 + e^{-(\alpha\sqrt{W_j} + \beta_0\sqrt{W_j}UNEMP_t + \beta_1\sqrt{W_j}UNEMP_{t-1} + \beta_2\sqrt{W_j}UNEMP_{t-2} + \mu_t)}} \dots$$

$$P_i\sqrt{W_j} = \frac{1}{1 + e^{-(\alpha\sqrt{W_j} + \beta_i \sum_{i=0}^{n=2}\sqrt{W_j}UNEMP_{t-i} + \mu_t)}} \dots (5)$$

RGDP = Real Gross Domestic Product, UNEMP = unemployment rate, GDP = Gross Domestic Product, $\sqrt{W_j}$ = weighted coefficient, ln = log and $\alpha\ \&\ \beta_i$ = parameters.

$$\left(\frac{\partial RGDP}{\partial UNEMP}\Big|\partial\alpha = 0\right) = \beta_i < 0$$

As mathematically illustrated above. The change in RGDP as a result of a unit change in $UNEMP_i$, holding the intercept constant is expected to be negative. This is as stated by Okun's law. This negative relationship is shown in the value of β_i.

RESULTS ANALYSIS AND INTERPRETATION

Table-4.2: Weighted Grouped Logit Regression Result

Variables	Coefficients	S. Error	T	$p > |t|$	95% C.I	
$unempq_t$	-.630984	.2544313	-2.48	0.017	-1.145209	-.1167592
$unempq_{t-1}$	1.217716	.5416108	2.25	0.030	.1230793	2.312352
$unempq_{t-2}$	-.713995	.3294393	-2.17	0.036	-1.379817	-.048173
constant	-1.698325	.3453576	-4.92	0.000	-2.396318	-1.000331

Source: Researcher.

Employing the odds method of interpretation:

$unempq_t$; For a unit change in the weighted present quarter values of unemployment rate, the weighted odds in favour of an inverse change in quarterly output changes by 0.766, holding every other variable constant in the model.

$unempq_{t-1}$; For a unit change in the weighted last quarter's values of unemployment rate, the weighted odds in favour of a direct change in quarterly output changes by 0.807, holding every other variable constant in the model.

$unempq_{t-2}$; For a unit change in the weighted last two quarter's values of unemployment rate, the weighted odds in favour of an inverse change in quarterly output changes by 15.50, holding every other variable constant in the model.

From the interpretation of the result above, it is observed that for an increase in the weighted value of first and last two quarter's unemployment rate, output will reduce or decrease by approximately one unit each and vice versa. On the other hand, if weighted unemployment rate of the immediate last quarter increases by a unit, its impact on the present quarterly output will increase more than proportionally (i.e 15.5 units). This is true because if unemployment rate increases for the last quarter, it means the unemployment also increased in that last quarter, consequently, some workers were retrenched and those who were not retrenched will increase productivity (output) so as to be found effective and efficient and not to lose his/her job. Hence the present quarterly output increases more. This is exactly the case of Oceanic Bank PLC during the merging of banks in 2011/12 and even other banks in Nigeria, were many bankers lost their jobs and the few left fear losing their jobs as well but had no choice than to increase their productivity and by so doing, increases output.

$$\left(\frac{\partial RGDP}{\partial UNEMP}\Big|\partial\alpha = 0\right) = \beta_1, \beta_3 < 0\ As\ expected$$

While $\left(\frac{\partial RGDP}{\partial UNEMP}\Big|\partial\alpha = 0\right) = \beta_2 > 0$
$Not\ as\ expected\ but\ economically\ justified$

There exist a negative relationship between present quarterly economic output and present quarter and last two quarter's unemployment rate as shown in literatures. While the last quarter unemployment rate is positively related with the present quarter's output level because when workers are retrenched last quarter, those left employed suffer from insecurity of their jobs and consequently increase their effectiveness, efficiency and even work harder so as not to be retrenched but retain their jobs. Thus making last quarter unemployment rate, positively related to present output.

GLOGIT PROBABILITY AND RATE OF CHANGE IN PROBABILITY

The probability that real gross domestic output (RGDP) will reduce for an increase in quarterly unemployment rate decreases. For instant, in the first and second quarters of 1991, unemployment rates were 5.375 and 5.525, the probability that national output falls was 0.0589431 and 0.0583111. However, when the third quarter unemployment rate was 11.3263, the probability for a fall in national output was 0.0382453. (**See Appendix8**). This however could be true given that a unit increase in unemployment rate per quarter leads to approximately a unit reduction in national output, and hence a small significant probability impact on national output to a unit change in unemployment rate per quarter.

Consequently, one would have to check the rate of change in the probability for each change in the level of unemployment rates each quarter. This is represented in the graph (figure) below, plotting the quarterly levels of unemployment rates on the horizontal axis and the rate of change in probability on the vertical axis:
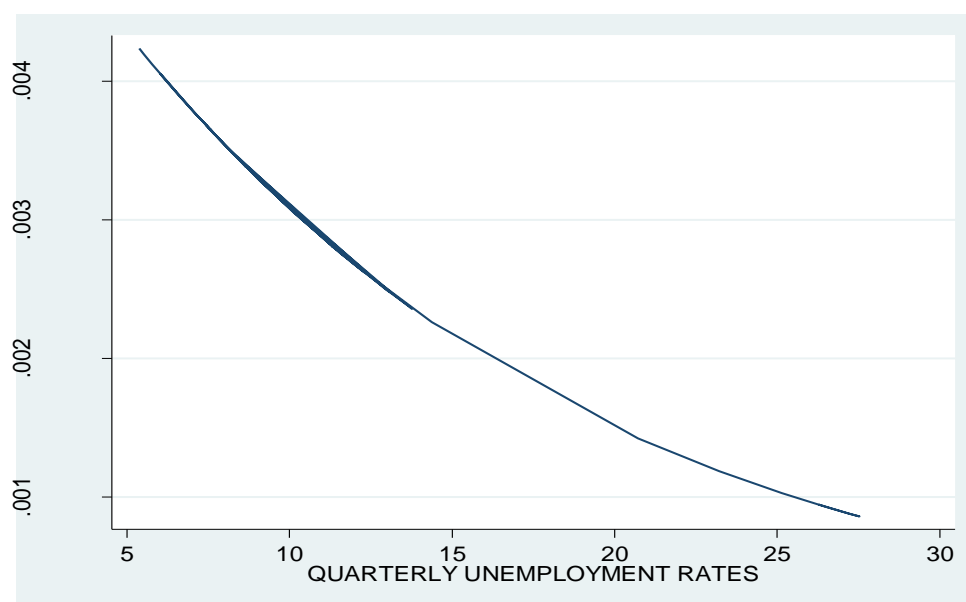

Fig-4.0: Glogit Rate of Change in Probability Result
Source: Researchers' computation (**see Appendix8**)

From the figure above, as the level of unemployment per quarter increases, the rate of change in the probability also decreases, showing a negative relationship between the rate of change in the probability and the quarterly unemployment rates. This however suggest that the rate of change in probability, changes in the probability and the probability of a fall in the level of national output for a rise in the level of unemployment rate will diminished as the unemployment rate increases indefinitely. Then, this suggest that there might not be any change in the level of national output when there exist an increase in the level of unemployment rates in Nigeria, consequently, the national output will den be produced by machines and not labour and such raises a question in our minds, is labour productivity significant in Nigerian economy,

does the level of national output represent the real productivity in Nigeria or is it just a mare figure?

CONCLUSION AND RECOMMENDATION

We shall first of all make this emphasis that policies or just making policies is not enough. In fact it is just a necessary condition to moving an economy from the present known stage to a future target state. So on this note I urge and emphasize more on its (policy) implementation.

However, from the findings of this research work, we have to prescribe policies that will help better the economy of Nigeria which is one of the essence of research works. Nigerian show make a master plan the can be rolled over after few years and for which its yearly goal will be executed via the Federal

Government's annual Budget. The long term plan will be to reduce unemployment, but there are steps which have to be taken to get there.

The Government should first of all, equip the Agricultural Sector and increase their productivity using more of labour intensive than capital intensive means of production. This will however help and equip our industrial and manufacturing sector to produce more and to produce more both by the Agricultural and manufacturing sector entails increase in economic product and reduction in unemployment. It is important to note that to reduce unemployment is to curtail the level of crime rate in Nigeria. It is said that an idle man is a devil's work-shop. The youths of this economy are crying out, reaching for any kind of job, even if it is underemployment. Government in the verge to equip these to mega sectors in the Real sector and create new businesses as well and hence increasing employment.

Government should also reduce this emphasis they make on self-employed businesses as those require amongst other things, a huge amount of capital, special skills, and contingent management. Which every youth don't possess and even their contribution to the RGDP is minimal. Rather they should focus more attention on establishing businesses and try as much as possible to reduce the unemployment rate.

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