Innovations

Macroeconomic Dynamics and Unemployment in Nigeria: The Moderating Role of Government Expenditure

Eunice O. Akhigbe[1], Ese Urhie[2], Ebenezer I. Bowale[3]

Department of Economics and Development Studies, Covenant University, Ota, Nigeria.

Abstract

This study examines the interactive effect of government expenditure and credit to the private sector as well as inflation and economic growth on unemployment rate in Nigeria. It employed ARDL and annual data from 1991 to 2021. The bounds test of the ARDL specification suggests the presence of cointegration among the variables. Which include unemployment, inflation, economic growth, credit to the private sector and government expenditure. Thus, there is a significant long run relationship between unemployment and the explanatory variables. The long run ARDL shows that economic growth government expenditure (both capital and recurrent) as well as the interaction between government recurrent expenditure and credit to the private sector have negative impact on unemployment. The result confirms the Okun's law nexus. It also shows that increase in government spending and its interaction with credit to the private sector holds prospects for reducing unemployment rate in Nigeria. On the other hand, inflation, credit to the private sector and its interaction with government capital expenditure have a positive impact on unemployment in Nigeria. Thus, the findings failed to support the Phillips curve hypothesis in Nigeria. The study recommends thatdevelopment financial institutions such as the Bank of Industry (BOI) should be mandated to allocate a higher proportion of their credit to job-creating ventures. Also, the problem of corruption should be addressed in order to enhance the efficiency of government spending.

Keywords: Unemployment, Economic growth, Inflation, Credit to private sector, Government expenditure, ARDL

1. Introduction

Unemployment is one of the macroeconomic objectives of any nation. The incidence of unemployment globally has presented mixed results in the past three decades (1991 -2021). While some countries have moved from high levels of unemployment to low levels (Trinidad and Tobago, from 18.5 % in 1991 to 4.8% in 2021; Poland, from 12.98% in 1991 to 3.4% in 2021), the reverse is the case for other countries (Armenia, from 1.6% in 1991 to 19.3% in 2021;

Costa Rica, from 5.37% in 1991 to 17.9% in 2021). In 2021, unemployment rate among countries of the world ranged between 33.6% (South Africa) and 0.26% (Qatar). Another observation is that while some countries have experienced persistent high levels of unemployment during the period (Botswana, Congo Rep., Djibouti, Eswatini, Lesotho and South Africa), others have maintained persistent low rates. They include Cambodia, Chad, Myanmar, Qatar and Rwanda (World Bank, 2022). Nigeria is one of the countries that has experienced persistent increase in unemployment rate since 1991. It increased from 4.1% in 1991 to 9.8% in 2021. Until 2015, unemployment rate in Nigeria hovered between 3.7 and 4.6%. the first quantum leap was in 2016 when it hit the 7% mark. As shown in figure 1, it has increased persistently since then to 9.8% in 2021.

High levels of unemployment impose economic, psychological and social costs on both individuals and the society (Byrns and Stone, 1995; Frank and Bernanke (2004). Economically, it leads to loss of output as a result of unutilized labour force; loss of income to the unemployed and increased cost on government due to increase in unemployment compensation. The psychic cost is felt mainly by the unemployed and the family members as it results in low self-esteem, depression and suicidal behaviors. The social cost of unemployment to individuals include anger, frustration and despair, which often lead to crime, domestic violence, drug abuse, alcoholism and other social vices. On the part of society or government, more public resources will be spent to address the problems mentioned above.

As a macroeconomic objective, several theories that explain changes in unemployment rate have been developed. These include the Phillips curve, Okun's Law, monetary as well and fiscal policy. Phillips curve hypothesis maintains that there is a trade-off between inflation and unemployment rate. The hypothesis indicates that if a nation desires to lower inflation rate, then it must be ready to accept an increase in unemployment. Okun's law posits that an extra percentage point of cyclical unemployment is associated with about 2 percentage point increase in the output gap measured in relation to potential output. Rapid economic growth, stable prices and full employment are major objectives that every government strives to achieve through the use of appropriate monetary and fiscal policy tools. In a mixed economy like Nigeria, the government plays two major roles in employment generation; (i) it employs labour directly and (ii) indirectly, by creating the enabling environment for the private sector to thrive. Government also promote the development of human capital that enhances the productivity of labour, thus making them more efficient and employable.

Inflation (INF) in Nigeria experienced a sharp increase from increase from 1991 to 1995 when it peaked at 77.8%. Thereafter it nose-dived to 2.3% in 1996. Between 1997 and 2021, inflation rate in Nigeria hovered between 6.6 and 18.9%. On the average economic growth (YGR) during the period under review is 4.1%. The value of 15.3 in 2002 represents an outlier. Negative growth rates were recorded three times prior to the millennium. However, for most of the 21st

Century the rate has been positive except for 2016 and 2020. The 2020 performance could be attributed to the Covis-19 pandemic. Credit to the private sector (CPS) by banks in Nigeria has a maintained an upward trend all through the period under review. From N41 billion in 1991, CPS hit the N1 trillion mark in 2003. Seven years later (2010) the value of CPS crossed the N10 trillion mark. As at 2021, it stood at N32.8 trillion.

In the consideration of the performance of public expenditure in Nigeria, a disaggregated approach was adopted. This is premised on the study by Urhie (2014), that found a significant difference between the effect of government recurrent expenditure and capital expenditure on economic growth. Both government recurrent and capital expenditure have maintained an upward trend during the period under review. However, capital expenditure witnessed more. fluctuations than recurrent expenditure. For instance, there were on two declines in recurrent expenditure (1994 and 2014); while capital expenditure experienced eight fluctuations. Starting with the value of N38 billion in 1991, government recurrent expenditure increased to N9.1 trillion in 2021. On the other hand, capital expenditure increased from N28 billion in 1991 to N2.5 trillion in 2021.

Previous studies have examined the unemployment problem with respect to the Phillips curve hypothesis, Okun's law, monetary policy and fiscal policy in isolation (Anoke et al, 2021; Chuttoo, 2020; Dodo, 2022; and Eseyin, 2021): while others have examined the relationship between inflation rate and economic growth on one hand and unemployment on the other (Mohseni and Jouzaryan, 2016 and Thayaparan, 2014). Also, aside the fact that government expenditure could lead to direct employment of labour (Moszoro, 2021), it also plays a moderating role between other factors that influence unemployment and unemployment rate. This analysis is scarce in the literature. Thus, this study examines the effect of inflation, economic growth and the financial development on unemployment in Nigeria with government expenditure playing a moderating role. The specific objectives of the study include (i) to estimate the effects of economic growth, inflation and credit to the private sector on unemployment rate in Nigeria. (ii) to evaluates the extent to which government expenditure influences the relationship between credit to the private sector and unemployment in Nigeria using the autoregressive distributed lag model.

Figure 1: Macroeconomic factors and unemployment rate in Nigeria
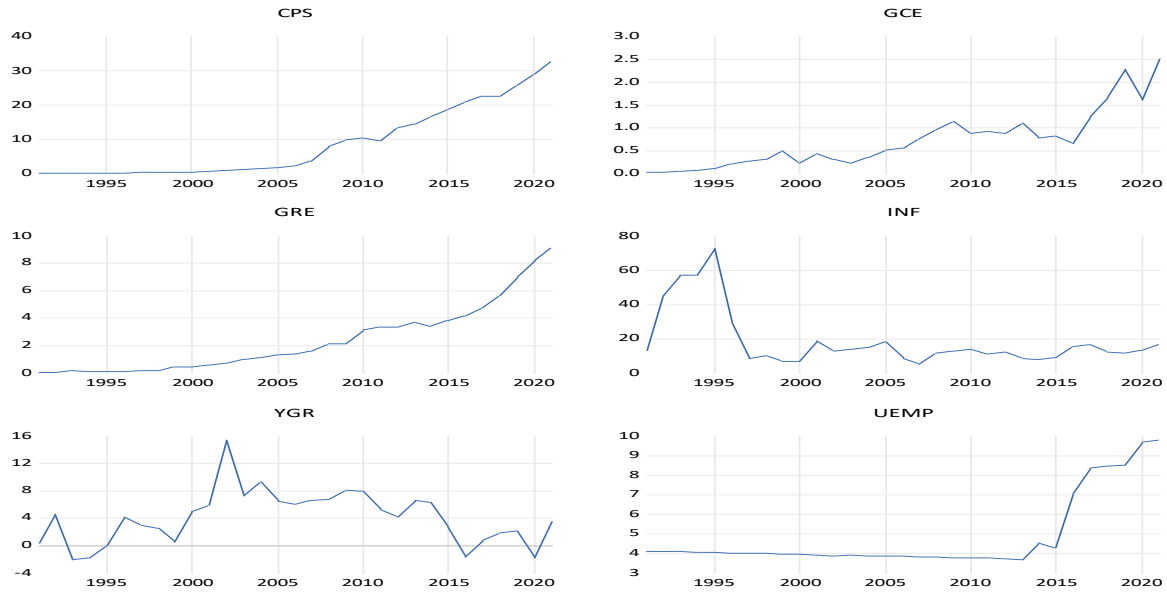
Source: Authors computation based on data from Central Bank of Nigeria and World Bank

2. Literature review

Numerous empirical studies have examined the Phillips curve hypothesis, which illustrates the trade-off between inflation and unemployment (Anoke et al., 2021; Daniel et al., 2021; Dodo and Idris, 2022; and Omran and Bilan, 2021). Anoke et al. (2021) examined the effects of inflation on unemployment in Nigeria from 1980 to 2018 among other macroeconomic factors (government spending, foreign direct investment). The co-integration and error correction model's result shows a long-term link between the estimated variables.A long-term relationship between the estimated variables is revealed by the co-integration and error correction model's output. It was shown that whereas government spending and foreign direct investment had the opposite influence on unemployment, inflation had a positive and significant impact on it in both the short and long terms. According to the analysis, Nigeria did not adhere to the Phillips curve theory during the time period under consideration. On the other hand, Daniel et al. (2021) were unable to demonstrate a significant association between inflation and unemployment in Nigeria using time series data from 1981 to 2020. Omron and Bilan's (2021) analysis of the Egyptian economy from 1980 to 2019 using a vector autoregressive model. According to the study, inflation has a negative impact on the unemployment rate and a positive association with GDP. Using data from Nigeria from 1985 to 2019, Dodo and Idris (2022) used the nonlinear autoregressive distributed lag model to investigate the relationship between inflation and unemployment. Based on actual data, the paper concludes that a nonlinear Phillips curve exists in Nigeria.

The study by Daniel, Israel, Chidubem, and Quansah (2021) set out to examine the factors that contribute to Nigeria's inflation and unemployment as well as to assess the validity of Philip's curve assumptions. Secondary data for the study came from the World Bank and the Central

Bank of Nigeria. Vector autoregressive and error-correcting algorithms were utilized in the investigation. The data shows that there is no obvious relationship between unemployment and inflation in Nigeria. Government inefficiency and a lack of domestic investment may be the root of unemployment, while currency rate depreciation and a lack of funds are to blame for Nigeria's rising price levels. According to the study's results, ineffective monetary and fiscal policy is to blame for the issues of unemployment and inflation. It was said that efficient use of fiscal and monetary policies was required to increase employment and output across all sectors in order to meet the increasing domestic demand and export. The full implementation of economic diversification strategies was also suggested. In order to stimulate business investment in Nigeria, the research also recommended increasing government spending on social infrastructure and offering incentives to companies. Overall, this will increase Nigeria's output, reduce unemployment, and promote non-inflationary growth.

Anoke, Ogbonna, Atuma, and Uzoechina (2021) studied the relationship between unemployment and some macroeconomic variables in Nigeria. The researcher employed co-integration, the vector error correction model, and the VEC Granger causality test to analyze the data used. The study's conclusions demonstrated that calculated factors had lasting associations. While government spending and foreign direct investment remained to have a negative association with unemployment in both the short and long runs, the VECM finding showed a strong positive relationship between inflation and unemployment in both the short and long ranges. The study made four recommendations for the government: (i) focus on strategies and policies that can attract foreign direct investment into the country; (ii) attempt to keep inflation low through appropriate monetary policy; (iii) encourage investment platforms and an environment that is conducive to effective and efficient national output; and (iv) consciously increase fiscal space for capital activities and projects that can spur economic growth. This paper came to the conclusion that Nigeria during the study period could not be used to demonstrate the inverse link provided by A.W. Philips in his Philip's curve hypothesis.

Idenyi, Favour, Johnson, and Thomas (2017) examined the relationship between unemployment and inflation in Nigeria from 1980 to 2015. The model included information on inflation, the money supply as a proportion of GDP, and total government spending as a percentage of GDP. The statistical tests used were the causality test, VECM test, and co integration test. According to the outcomes of the aforementioned experiments, both the long-term and short-term effects of inflation on unemployment in Nigeria over the study period were significant. The conclusion that government expenditure creates employment to the extent that inflation stays below the single digit limit may also be drawn from the results. This implies that lower unemployment results from higher government spending. Based on the research's conclusions, it was recommended that the government use discretionary policy to lower unemployment by increasing public spending and to maintain monetary stability by making use of traditional monetary instruments (like open market operations, discount rates, and special directives to lower the amount of money in circulation).

Esu and Atan (2017) made an effort to assess the validity of the Philip's curve theory in the Sub-Saharan African region. Panel data analysis was used to collect data for the study from 29 distinct regional nations. Data from 1991 to 2015 were gathered over a 24-year period. The annual figures for these countries' unemployment rate and inflation rate were provided by World Development Indicators (WDI) (2016). Inflation was measured using the consumer price index (CPI), while unemployment was calculated using total unemployment (estimated nationwide as a percentage of the labor force).The findings showed that there was no significant association between the rate of inflation and the rate of unemployment, which was obtained using a panel data analysis technique. The results disproved the presence of the conventional Philip's Curve in Sub-Saharan Africa, or the trade-off between inflation and unemployment.

According to Okun's Law (1962), there is a causal link between economic growth and unemployment. Some empirical studies that identified economic growth as a consequence of unemployment (Kreishan, 2011; Abu, 2016; Chuttoo, 2020; and Shah, Shabbir, and Parveen, 2022) appeared to have misunderstood this flow. This shouldn't be viewed as a test of Okun's Law, even though it is conceivable to assess how unemployment affects economic growth. The models created by Khalid, Akalpler, and Khan (2021), Amor and Hassine (2017), and Akeju and Olanipekun (2015) were characterized adequately, nevertheless. While the analyses by Amor and Hassine (2017) and Khalid et al. (2017) used data from Saudi Arabia and South Africa, respectively, Akeju and Olanipekun's (2015) analysis used data from Nigeria. All three studies found a strong and negative correlation between unemployment and economic growth over the short and long terms.

The relationship between Mauritius's economic growth and unemployment rates was examined by Chuttoo (2020). Okun's law-gap version, the autoregressive distributed lag (ARDL) limits cointegration test, and the ARDL error-correction model (ARDL-ECM) make up the technique for this work. The ARDL-ECM is used to estimate the long- and short-term links between economic growth and unemployment. The Okun's coefficient is computed by analyzing Okun's law in the context of Mauritius.The results of the tests show that there is a long-term and short-term negative cointegration between economic growth and unemployment, but it is not statistically significant. However, the result of the Okun's law-gap version shows that Okun's law is, in fact, relevant to the little economy of Mauritius. The Okun's coefficient states that in Mauritius, a 4% rise in the GDP growth rate causes a 1% change in the unemployment rate in the opposite direction.

Kreishan (2011) investigated the relationship between unemployment and economic growth in Jordan using Okun's law. Using annual data covering the years 1970 to 2008, time series techniques are used to assess the link between unemployment and economic growth and to determine Okun's coefficient. The study made use of the unit root, cointegration test, and a straightforward regression between unemployment rate and economic growth. ADF, or enhanced Dickey-Fuller, was also applied.The empirical results show that Okun's law cannot be validated

for Jordan. It follows that Jordan's unemployment problem isn't brought on by a dearth of economic growth. The study's findings indicated that the unemployment rate would not be considerably impacted by demand management-related economic methods. Implementing economic strategies centered on structural transformation and labor market reform would be preferable for Jordanian authorities.

Enejoh and Tsauni (2017) looked at how unemployment affected economic growth in Nigeria from 1970 to 2016. We looked at the unit root properties of the series. The results of the unit root show that the variables are co-integrated in order one. Therefore, this study used Johansen co-integration and the error correction mechanism (ECM) to assess the short- and long-term effects of unemployment on economic growth. Using the Granger causality test, the relationship between unemployment and economic growth was also investigated.The results show a long-term relationship between unemployment and economic growth in Nigeria. The unemployment rate has a positive impact on both short-term and long-term economic growth. Economic growth and unemployment have a unidirectional causal link, according to the Granger causality. The paper promoted economic diversification and career education at tertiary institutions.

(2010) Arshad and Erixon examined the relationship between GDP and unemployment. The aim of the study was to examine the applicability of Okun's (1962) link to the Swedish economy. The Hodrick-Prescott filter (HP) approach and the gap equation were used to test Okun's law in the short run, while the co-integration model and the error correction model were employed to evaluate the relationship between unemployment and GDP in the long run. According to the study, the Okun's law was valid for the Swedish economy from the first quarter of 1993 to the second quarter of 2009. The analysis found a relationship between unemployment and GDP over both the long and short terms.

Nwankwo and Ifejiofor (2014) looked into the reasons of unemployment in Nigeria and how it has impeded economic development. All of them are cited in the researcher's argument for this study. A descriptive research strategy was employed. The population includes every young person without a job in the three selected local government councils (Oyi, Idemili North, and South), according to NPC (2006). From each Local Government Council, 30 young people were chosen. The method of convenient sampling was employed. Both primary and secondary data sources were used in the investigation. The Pearson correlation test was used to examine the hypotheses. The results of the test suggest that unemployment is a hindrance to Nigeria's economic growth and development. The problems with unemployment in Nigeria have been helped by numerous government measures. There are tactics that might be suggested to ensure a decrease in the unemployment rate in Nigeria. The study also argued that in order to avert Nigeria's approaching energy calamity, the federal government must speed up and stabilize reforms in the power sector.

The applicability of the Phillips hypothesis and Okun's Law within the setting of a single model has been studied in several works (Thayaparan, 2014; Diakhoumpa, 2020; Warsame, Ali, Hassan

and Mohamed, 2022). Despite being a good thing, Thayaparan found that the gross domestic product has no statistically significant effect on unemployment. Instead, there is a statistically significant negative impact of inflation on unemployment. The period covered by Diakhoumpa's study in Senegal was from 1991 to 2018. The findings show that unemployment and growth have a negative long-run and short-run link, whereas unemployment and inflation have a positive long-run and short-run association. The Warsame et al. 2022 examination into Somalia confirmed both Okun's Law and the Phillips theory.

Tenzin (2019) examined the macrotrends in Bhutan's unemployment. The connection between economic expansion, inflation, and unemployment was studied between 1998 and 2016. The impact of inflation and economic growth on employment was calculated using the Autoregressive Distributed Lag (ARDL) model. According to the results of this empirical investigation, Bhutan's unemployment rate declined over the short and long terms without being impacted by economic expansion. In reality, economic growth was accompanied by an increase in the unemployment rate. However, there was a long-term positive association between inflation and the unemployment rate and a short-term negative correlation. In other words, there was an increase in short-term inflation due to an increase in the employment rate.If inflation is not controlled or monitored, it can also deter investment and limit economic growth, which will ultimately lead to more unemployment. This study urged policymakers to focus on sectors having a greater capacity to employ young employees and take into account the employment elasticity with respect to economic production.

Folawewo and Adeboje (2017) based their analysis on Okun's Law and Philips curve theory to determine the relationship between a few macroeconomic indices and unemployment in the Economic Community of West African States (ECOWAS). The study's findings demonstrated that GDP growth has a small but nonetheless significant impact on the unemployment rate, pointing to the region's low employment elasticity of growth. Inflation has a very favorable effect on unemployment, disproving the Phillips curve hypothesis.Labor productivity has a positive effect on the unemployment rate, which is the study's main finding that there is a trade-off between employment and labor productivity. Population increase had a positive impact, although foreign direct investment (FDI) and external debt only slightly worsened unemployment. A positive macroeconomic climate, according to the report, is crucial for promoting job growth in the ECOWAS region.

Mohseni and Jouzaryan (2016) examined the effects of unemployment and inflation on economic growth from 1996 to 2012. The Autoregressive Distributed Lag (ARDL) Model was used in this study to investigate and examine how unemployment and inflation affect economic growth across two time periods, short and long. EViews version 6.0 and Microfit version 4.0 were used to estimate the model. The results of the model estimation showed how inflation and unemployment have a significant and negative impact on economic growth over time, demonstrating that these factors slow down economic growth.The results of the model estimation showed how inflation and unemployment have a significant and negative impact on economic

growth over time, demonstrating that these factors slow down economic growth. This issue demonstrated the need for the government to develop thoughtful strategies and plans to reduce and control unemployment and inflation. The study's conclusions can be used by all recognized Iranian authorities, especially those in control of the nation's economic and social institutions, to attempt and minimize and regulate unemployment and inflation in order to encourage economic growth.

To better understand the short- and long-term correlations between economic conditions and unemployment rates in South Asian countries, Shabbir, Kousar, Kousar, Adeel, and Jafar conducted a 2019 study. A panel vector error correction model was used to find the long-run and short-run correlations between the unemployment rate and the selected economic parameters. Information was acquired for the years 1994–2016 from the WDI, WGI, and FDSD. The direction of the association was determined using the Granger causality test. Impulse response functions (IRFs) and forecast error variance decomposition were also employed to assess the link's long-term stability. At the 5% level of significance, the study's results showed a negative and statistically significant relationship between the government, internet users, mobile cellular subscribers, fixed broadband subscribers, and human capital and the unemployment rate of South Asian economies. However, the growth in the population and credit activity revealed a positive and significant association with the unemployment rate. Finally, the Granger causality test demonstrated that there is a bidirectional causal relationship between governance and unemployment rate, whereas there is just a one-way relationship between internet users and fixed broadband subscribers. There was no evidence of a short-term causal link between population increase, credit activity, mobile cellular subscriptions, or human capital.

The impact of money on the creation of jobs has also been the subject of some empirical studies. Ndubuaku et al. (2021) examined the effect of financial development on the employment rate in Nigeria using data from 1999 to 2019. The result shows that economic growth has a positive and statistically significant effect on the employment rate. Nteegah (2021) used data from Nigeria from 1981 to 2019 to assess the effect of financial inclusion on job creation. The results demonstrated that the near-term impact of deposit penetration, credit penetration, and domestic investment penetration on the unemployment rate was large and adverse. The long-term results show that bank branch penetration was the sole factor that reduced the unemployment rate.

To investigate the impact of environmental governance on employment, Jian, Xiaoqin, and Niandong (2018) introduced the mediating effect model using technological innovation as the intermediate variable. The Cobb-Douglas production function model served as the foundation for this one. Panel data from 2005 to 2015 were used in the empirical test of the study. The results show that environmental governance affects employment favorably, and high-intensity environmental governance will promote technological innovation, which will fuel job growth. Decision-making agencies can successfully minimize environmental governance-related unemployment while also effectively reducing environmental pollution by supporting technological innovation.

In spite of government efforts to create work, there are still many graduates roaming the streets and harming society as a whole, prompting Danjuma and Bala (2012) to examine the role of governance in job creation in Nigeria. Data was acquired using a descriptive approach, and interviews with various employment creation agencies were also conducted in order to provide empirical data.The findings indicated that unemployment has increased tension and hostility between the wealthy and the poor in Nigeria, leading to intercommunal fighting, the rise of terrorist groups like Boko Haram and Niger Delta militants, as well as issues with the security of people's lives and property like armed robberies, prostitution, and child trafficking. The report advises spending money on education to help with skill improvement and training.

Ochieng and Kim (2019) examined the effects of governance, financial market development, labor market freedom, and human capital on economic performance in resource-rich countries in Africa. The analysis showed that, using micro level employment growth as a proxy for economic success, governance and financial market development had a favorable and statistically significant relationship with employment growth. Employment growth is negatively impacted by the expansion of human capital and labor market freedom. These findings imply that strong governance, as measured by political stability and governmental honesty, inspires trust in investors and entrepreneurs, boosting economic growth through private sector investment. When there is more economic uncertainty due to poor governance, investors perceive a greater risk of investing. As a result, risk-averse investors can be hesitant to take actions that will benefit the economy or they might decide to completely exit the market. By increasing the effectiveness of allocative allocation and the flow of money to active and developing enterprises that typically rely on outside investment, financial market development fosters growth. Contrary to logic, employment growth and labor market freedom are negatively correlated in nations with a lot of natural resources. This conclusion would suggest that when hiring and firing rights rise as a result of less government control of the labor market, businesses become less committed to their workforces. This is so that businesses can easily fire employees without incurring significant expenses.

3. Methodology

This study explores the relationship between unemployment in Nigeria and inflation, economic growth, and financial development, with government spending acting as a moderator. The World Bank's World Development Indicators from 1991 to 2021 and the Central Bank of Nigeria's Statistical Bulletin provided the data for this analysis. Time series variables make up the majority of the variables considered in this study. Typically, these variables are not steady, making the traditional OLS estimation technique inadequate. The Auto-regressive Distributed Lag (ARDL) method was used based on the unit root test performed utilizing the ADF test. Table 1 displays the final verdict.

The autoregressive distributed lag (ARDL) model according to Pesaran and Shin (1999) and Pesaran et al (2001) is stated below.

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta i \Delta y_{t-1} + \sum_{i=0}^{n} \delta i \Delta x_{t-1} + \varphi_1 y_{t-1} + \varphi_2 x_{t-1} + \mu_t \qquad (1)$$

Where;

β_i, δ_i = short-run coefficients

φ_1, φ_2 = ARDL long-run coefficients

μ_t = disturbance term

The Error Correction Model (ECM)

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{n} \beta i \Delta y_{t-1} + \sum_{i=0}^{n} \delta i \Delta x_{t-1} + \varphi_1 z_{t-1} + \mu_t \qquad (2)$$

In the ARDL model, ECM (z_{t-1}) is replaced with y_{t-1} and x_{t-1}. So, when the long-run term ($\varphi_1 y_{t-1} + \varphi_2 x_{t-1}$) is replaced with its residual (z_{t-1}), the model reverts to ECM. The lagged residual series would still be $z_{t-1} = (Y_{t-1} - b_0 - b_1 x_{t-1})$. Thus, what is done in ARDL model is to include the same lagged level as is done in the ECM without restricting their coefficients. The ARDL model is a form of unrestricted ECM because all the long-run relationship variables (x_{t-i}) are specified and not restricted.

In view of the objectives of the study, the following model was estimated

$$UEMP = f((INF, YGR, CPS, GCE\ GRE) \qquad (3)$$

Where:

UEMP; Unemployment Rate,

INF;   Inflation rate

YGR; Economic Growth Rate,

CPS;   Credit to the $_{Private}$ Sector

GCE; Government Capital Expenditure

GRE; Government Recurrent Expenditure

In order to evaluate the second objective of the study, the following econometric model was specified.

$$UEMP = \beta_0 + \beta_1 INF + \beta_2 YGR + \beta_3 CPS + \beta_5 GCE + \beta_6 GRE + \beta_7 GCECPS + \beta_8 GRECPS + \mu \quad (4)$$

Where:

β_0; is the intercept,

$\beta_1 - \beta_8$ are the coefficients of the different variables

4. Results and discussion

The use of time series data demands that the series be tested for stationarity in order to avoid spurious regression results. The Augmented Dickey-Fuller (ADF) test shows a mixture of both I(0) and I(1) series. This motivated the use of the ARDL estimation technique. The short run, error correction and long run regression were conducted. The results and discussions are presented below.

Unit Root Test

Table 1 below shows the results of the unit root test for the variables in this study. The Augmented Dickey-Fuller (ADF) test was employed. The result shows that unemployment rate (UEMP) and the interactive variables (GCECPS and GRECPS) were stationary at levels; while INF, YGR, CPS, GCE and GRE became stationary after first difference. It should be noted that both the intercept and trend were included because they were found to be statistically significant.

Table 1: Unit Root Test Result

Variable	ADF	Critical Value @ 5%	Order of Integration
UEMP	.836	-3.603	I(0)
INF	-5.105	-3.603	I(1)
YGR	-7.604	-2.967	I(1)
CPS	-4.829	-3.574	I(1)
GCE	-7.360	-3.514	I(1)
GRE	-3.728	-3.632	I(1)
GCECPS	4.741	-3.622	I(0)
GRECPS	10.523	-3.568	I(0)

Source: Authors' Computation Using E-Views. 2023

From the ADF results of variables presented above, , it would be observed that there is a mixed order of integration of I((1) and I(0) among our variables of interest. This implies that an ARDL bounds test will be conducted to ascertain if there is a long run equilibrium relationship among the variables

Auto-regressive Distributed Lag (ARDL) Error Correction Regression Result

The estimated ARDL error correction regression result is presented in tables 2 and 3. These are the short run result of the ARDL as well as the bound's test result. The F-statistic of 27.7 in the bounds test result is greater than the 5% lower bound of 3.31 and upper bound of 4.63. this shows that there is a long run equilibrium relationship between the dependent variable and the independent variables. This implies that the model has passed the cointegration test.

The ARDL short run result (Table 2) shows an error correction term is -0.42 which is statistically significant at 1% level of significance. This shows a moderate speed of adjustment from the short

run to the long run. In the event of any disequilibrium in the system it takes an average speed of 42% to adjust back from the short run to the long run. The R^2 of 0.985 shows that the model has a good fit. The probability value of the F-statistic for the overall significance of the model also shows a good fit.

Table 2: Short run ARDL Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.853844	0.073673	11.58966	0.0000
@TREND	0.269286	0.011766	22.88723	0.0000
D(YGR)	-0.045362	0.008230	-5.511625	0.0015
D(YGR(-1))	-0.019591	0.007514	-2.607177	0.0403
D(INF)	0.002926	0.002254	1.298367	0.2418
D(INF(-1))	0.007748	0.001828	4.239029	0.0054
D(CPS)	-0.003097	0.033815	-0.091572	0.9300
D(CPS(-1))	-0.954149	0.052287	-18.24830	0.0000
D(GRE)	-1.895279	0.173321	-10.93508	0.0000
D(GRE(-1))	-1.348052	0.150356	-8.965712	0.0001
D(GCE)	-1.054185	0.206030	-5.116668	0.0022
D(GCE(-1))	1.080621	0.128152	8.432321	0.0002
D(GRECPS)	0.093296	0.009916	9.409083	0.0001
D(GRECPS(-1))	0.343420	0.016375	20.97255	0.0000
D(GCECPS)	0.083340	0.010316	8.078445	0.0002
CointEq(-1)*	-0.419737	0.019138	-21.93230	0.0000

Source: Authors' Computation Using E-Views. 2023

Table 3 Bounds Test Result

*p-value incompatible with t-Bounds distribution.

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	27.75149	10%	2.38	3.45
k	7	5%	2.69	3.83
		2.5%	2.98	4.16
		1%	3.31	4.63
t-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-21.93230	10%	-3.13	-4.53
		5%	-3.41	-4.85
		2.5%	-3.65	-5.14
		1%	-3.96	-5.49

Source: Authors' Computation Using E-Views. 2023

In the short run, current level of YGR and the one period lag have negative and significant effect on unemployment in Nigeria. Also, INF_{t-1} has a positive and significant effect on unemployment rate. On the other hand, CPS_{t-1} has a negative and significant impact on unemployment rate. Both GRE and GRE_{t-1} have negative but significant effect. Similarly, Although, both GCE and GCE_{t-1} are found to be statistically significant, they have different effects in terms of signs.

GRECPS and GRECPS$_{t-1}$ have positive and significant effect on unemployment rate. A similar result was also found for GCECPS and GCECPS$_{t-1}$.

The long run ARDL result (Table 4) shows that INF, CPS, AND GCECPS have positive effect on unemployment in the long run. On the contrary, YGR, GRE, GCE and GRECPS all have adverse effect. However, only GRE was found to be statistically significant at the 5% level of significance.

Table 4: Long run ARDL Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
YGR	-0.014908	0.079309	-0.187977	0.8571
INF	0.007690	0.014015	0.548723	0.6030
CPS	1.019089	0.440775	2.312041	0.0601
GRE	-5.183646	2.018035	-2.568660	0.0424
GCE	-3.629620	2.471199	-1.468769	0.1923
GRECPS	-0.180680	0.118410	-1.525883	0.1779
GCECPS	0.034915	0.175380	0.199083	0.8488

EC = UEMP - (-0.0149*YGR + 0.0077*INF + 1.0191*CPS -5.1836*GRE -3.6296*GCE -0.1807*GRECPS + 0.0349*GCECPS)

Source: Authors' Computation Using E-Views. 2023

Diagnostic Tests

Before conclusions or policy inferences are drawn from estimated regression models it is necessary to conduct relevant postestimation and diagnostic tests to verify the validity of the model. The tests include the normality test, serial correlation test, homoscedasticity test, linearity as well as stability tests.

The correlogram_Q-statistics and the Breusch-Godfrey Serial Correlation LM Test at up to 2 lags were conducted to test for serial correlation in the model. All the probability values are greater than 0.05 except one. This implies that there is no evidence of serial correlation. Serial LM Test is another form of serial correlation test. The estimated F statistics is greater than 0.05 which means that there is no evidence of serial correlation
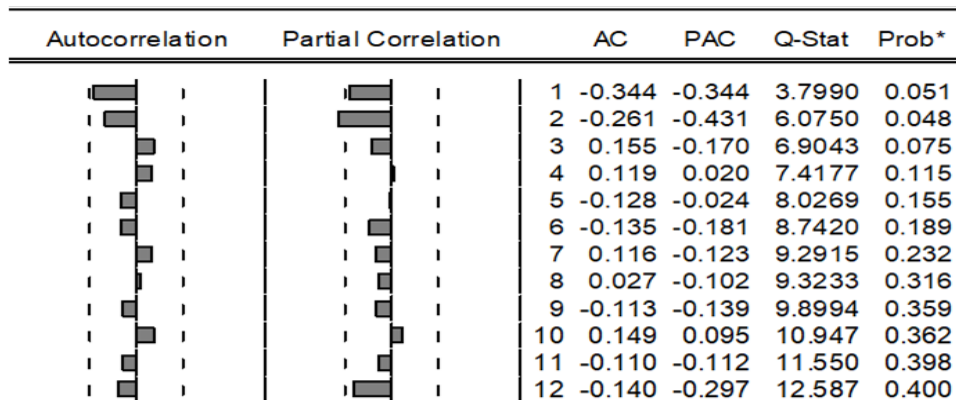
Figure 2: Correlogram Q-statistics

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob*
		1	-0.344	-0.344	3.7990	0.051
		2	-0.261	-0.431	6.0750	0.048
		3	0.155	-0.170	6.9043	0.075
		4	0.119	0.020	7.4177	0.115
		5	-0.128	-0.024	8.0269	0.155
		6	-0.135	-0.181	8.7420	0.189
		7	0.116	-0.123	9.2915	0.232
		8	0.027	-0.102	9.3233	0.316
		9	-0.113	-0.139	9.8994	0.359
		10	0.149	0.095	10.947	0.362
		11	-0.110	-0.112	11.550	0.398
		12	-0.140	-0.297	12.587	0.400

Table 5: Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	2.888391	Prob. F(2,4)	0.1674
Obs*R-squared	17.13515	Prob. Chi-Square(2)	0.0002

Also, using the ARCH heteroskedasticity test shows probability of both F test and Chi square are greater than 0.05; which means there is no problem of heteroscedasticity. The ARCH test is more powerful than the BPG test.

Table 6: Breusch – Pagan – Godfrey Heteroskedasticity Test

Null hypothesis: Homoskedasticity

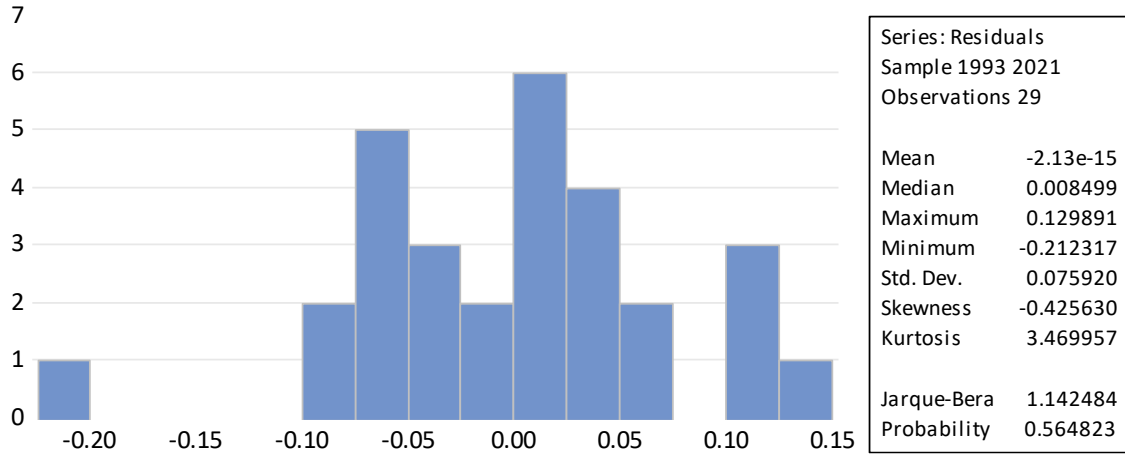|			
F-statistic	0.540760	Prob. F(22,6)	0.8644
Obs*R-squared	19.27755	Prob. Chi-Square(22)	0.6281
Scaled explained SS	1.019102	Prob. Chi-Square(22)	1.0000

Table 7: the ARCH Test

Heteroskedasticity Test: ARCH

F-statistic	0.500829	Prob. F(1,26)	0.4854
Obs*R-squared	0.529161	Prob. Chi-Square(1)	0.4670

The estimated Jarque-Bera(J-B) probability as shown in Figure 3 is greater than 0.05 implying that there is no evidence of non-normality; that is, the residual is normally distributed

Figure 3: Normality Test

Series: Residuals	
Sample 1993 2021	
Observations 29	
Mean	-2.13e-15
Median	0.008499
Maximum	0.129891
Minimum	-0.212317
Std. Dev.	0.075920
Skewness	-0.425630
Kurtosis	3.469957
Jarque-Bera	1.142484
Probability	0.564823

The Ramsey RESET test for model stability shows that the t-stat and F-stat probability values are greater than 0.05 which shows that the model is well specified. The mathematical form of the model is well specified. Thus, there is a linear relationship between the dependent and independent variables. Both the CUSUM and CUSUM-CUSUM tests (Figures 3 and 4) show that the model is stable over time

Table 8: Ramsey RESET Test

	Value	df	Probability
t-statistic	2.420422	5	0.0601
F-statistic	5.858441	(1, 5)	0.0601
Likelihood ratio	22.48964	1	0.0000

F-test summary:			
	Sum of Sq.	df	Mean Squares
Test SSR	0.087073	1	0.087073
Restricted SSR	0.161387	6	0.026898
Unrestricted SSR	0.074314	5	0.014863

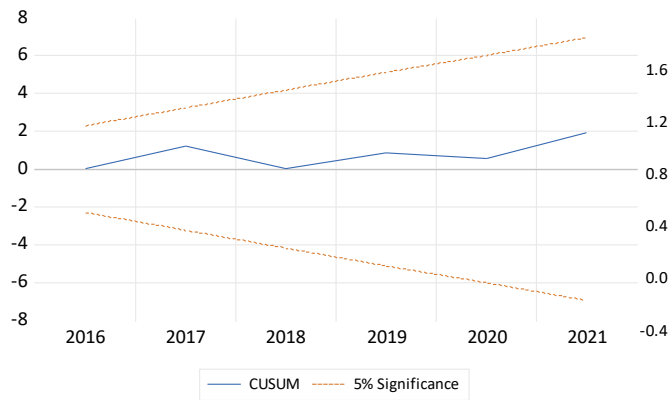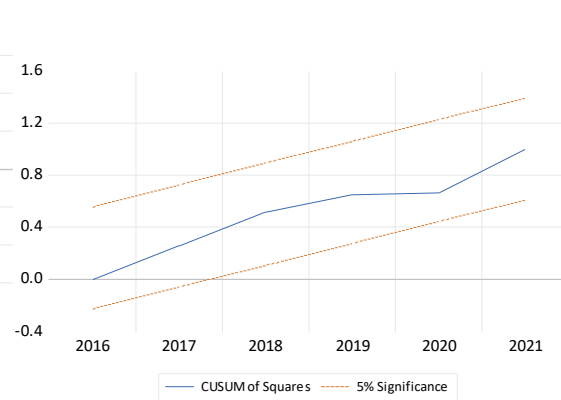| LR test summary:	
	Value
Restricted LogL	34.12381
Unrestricted LogL	45.36863

Figure 4: GUSUM Test

Figure 5: CUSUM – CUSUM Test

The short run ARDL result shows that economic growth, credit to the private sector and government recurrent expenditure have negative effect on unemployment rate in Nigeria. On the other hand, inflation and government capital expenditure has positive effect. In addition, all the coefficient estimates were found to be statistically significant except, CPS and INF. The result confirms the Okun's law. In the short run, the interactive effect of government recurrent expenditure and credit to the private sector is positive. However, the result showed an inverse relationship in the long run. In the short run, inflation and credit to the private sector had a positive impact on unemployment. Thus, the data does not support the Phillips curve hypothesis in Nigeria.

The long run ARDL result supports the Okun's hypothesis. That is an increase in economic growth in Nigeria leads to a reduction in unemployment rate. Similarly, both classifications of government expenditure have a negative impact on unemployment rate in Nigeria. Also, the interaction between government recurrent expenditure and credit to the private sector also has an inverse effect on unemployment rate in Nigeria. It is worthy to note that the relationship between unemployment and inflation did not conform with the Phillips curve hypothesis. Among all the variables only government recurrent expenditure was found to be statistically significant.

5. Conclusion and policy implications

Nigeria experienced a persistent increase in unemployment rate from 2015 to 2021. The study was conducted to analyze the relationship between the rate of unemployment in Nigeria and key macroeconomic variables from the standpoint of existing theories such as the Okun's law and the Phillips curve hypothesis. Aside inflation (INF) and economic growth (YGR), credit to the private sector and government expenditure were also considered. The overall objective of the study is to ascertain the existence of a long run relationship among key macroeconomic variables that could influence unemployment rate in Nigeria. The result revealed that although the model for the study conforms to Okun's law, it was not statistically significant. The Phillips curve

hypothesis could not be ascertained from the model. The effect of credit to the private sector (CPS) was found to be positive. This implies that most of the financing by the banking sector was not to the labour-intensive sectors such as agriculture. Both government recurrent (GRE) and capital expenditures (GCE) were found to have an adverse effect on unemployment rate. However, only government capital expenditure was found to be statistically significant. The interaction between these two categories of government spending and credit to the private sector presents mixed results. While GRECPS had an adverse effect on unemployment rate as expected, GCECPS had a positive effect. Since CPS had a positive effect and GCE an adverse effect, it means that the quantity of capital expenditure was inadequate to offset the positive effect of credit to the private sector.

In view of the findings from the study, there is need for the government to design a strategy to control the high rate of unemployment in the country I order to minimize its attendant consequences. First, since the government has little or no control over the distribution of credit to the private sector by banks, the development financial institutions such as the Bank of Industry (BOI) should be mandated to allocate a higher proportion of their credit to job-creating ventures. Secondly, government capital expenditure which ought to orchestrate both direct and indirect job creation through backward and forward linkages. The fact that this effect is not statistically significant and its interaction with CPS resulted in an overall positive effect calls for a deeper evaluation of the efficiency of government spending. According to Transparency International Nigeria ranks among the most corrupt countries in the world in recent times. Thus, addressing this issue will go a long way in enhancing the efficiency of government expenditure which will have a ripple effect on other macroeconomic objectives such as employment.

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