Impact of Exchange Rate on Unemployment in Nigeria

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Abstract- ***Considering the high unemployment rate, available studies for Nigeria are one-sided as they focused only on aggregate unemployment without considering disaggregating unemployment which could provide areas of focus for the monetary policy authority towards tackling unemployment in Nigeria. This study examines the impact of exchange rate on disaggregated unemployment rates (youth and adult) in Nigeria. It employed the autoregressive distributed lag technique and estimation procedures under the framework of the Philips curve theory and Taylor's rule. The data for this study is an annual time series data that covers from 1981 to 2021. The data for the variables were sourced from the Central Bank of Nigeria (CBN) statistical bulletin and the African Development Bank database. The Econometric software for estimation is STATA 17. The results showed a positive and significant impact of real exchange rate on aggregate, youth and adult unemployment in both the long and short run. The (high) exchange rate discourages aggregate demand because it pushes the prices of goods and services high. The findings imply that Nigeria needs an exchange rate appreciation to significantly influence an unemployment rate reduction in the economy. Measures should be taken to appreciate the exchange rate if the unemployment challenges in the country must be tackled. It is necessary to bear in mind that an appreciation of the exchange rate would bring about exchange rate appreciation pressures. But, with foreign exchange interventions, the quantity of money – the money in circulation could be watched carefully to alleviate the likely appreciation pressures to keep a stable exchange rate.***

I. INTRODUCTION

Macroeconomic objectives of any economy may be summarised as follows : achieving sustainable economic growth, maintaining price stability, ensuring full employment, and achieving balance of payment equilibrium. Achieving Full employment has remained a major challenge for developing nations such as Nigeria. This challenge has been a focal point of attention in recent years. It is often assessed by the measurement of the unemployment rate. Unemployment refers to a condition in which individuals who are ready and available to work at the current wage rate are unable to secure employment opportunities (Echem, Aduku & Ejiofor, 2022). Analysis of the unemployment rate is mainly on the demographic decomposition – youth, adult and aggregate groups. The concept "youth" covers persons that are between the ages of 15 to 24 years and "adult" denotes persons that are aged 25 years and above (International Labour Organization – ILO, 2016).

Unemployment refers to the state in which individuals either cease their job search or labour under substandard circumstances (known as underemployment), resulting in negative consequences for the individuals, their families, society, and the economy. Unemployment can have lasting effects on an individual's future job prospects and may lead to persistent patterns of unproductive or inappropriate labour behaviour throughout their lifetime. It can also yield a sense of vulnerability, idleness and uselessness among the labour force. An apparent gain in claiming the productive potentials of the unemployed is an economic one. The unemployed are a costly group. Unemployed individuals may fail to contribute to a nation's economic welfare. The loss of earnings among the workforce translates into reduced savings and diminished aggregate demand. Many unemployed people, particularly youth, depend financially on their families, thereby limiting household resources for consumption and investment. Societal investments in education go underutilized, while the government faces decreased contributions to social security and is often forced to raise spending on remedial programs,

including initiatives aimed at preventing crime and drug abuse. All these serves as a threat to the economic growth and development potentials of a country (Remeikienė, Žufan, Gasparėnienė & Ginevičius, 2020).

With the high rate of unemployment, the disposable income of individuals falls from a lack of stable income. This causes a decline in goods and services. It is obvious, that businesses could be adversely affected by the decline in consumption, which is usually accompanied by a fall in gross domestic product. Therefore, efforts to put an end to unemployment as a macroeconomic problem is dominating the macroeconomic policy objectives of policymakers today in the world , especially in developing countries such as Nigeria. The policy authority responds to increasing unemployment by enhancing aggregate demand, household total spending, enterprises, and government in the economy. Expansion of the economy – expanding the production of goods and services – improving the demand for goods and services; enterprises could then start to employ more workers to increase the supply to meet the demand by consumers (Zhang & Davise, 2023). One of the policies that have been employed over the years to curb unemployment is monetary policy.

Monetary policy is a set of actions designed to regulate the value, availability, and cost of money within an economy, in line with the anticipated level of macroeconomic activity during a specific period and the overarching macroeconomic goals it seeks to achieve. This is accomplished by altering the conditions under which they supply the liquidity demands of the economy. The central bank provides liquidity to players in the money market by adjusting various components of its balance sheet or implementing actions that have a more direct impact on interest rates (Essien et al., 2016). Central banks are the sovereign authority mandated to make money available and administer monetary policy. In Nigeria, the responsibility for implementing monetary policy lies with the Central Bank of Nigeria (CBN). Over the years, the CBN has employed various monetary policy instruments such as the exchange rate, money supply, and interest rate to influence economic outcomes (Okeke & Chukwu, 2021).

The exchange rate, defined as the weighted average value of a country's currency relative to those it trades with, is influenced by the importance the domestic economy assigns to the various foreign currencies within the trading pool. It is one of the major monetary policy instrument that central banks and governments can use to influence a country's economic stability, inflation, trade balance, and overall growth. It is the price at which one currency can be exchanged for another. Central banks and monetary authorities uses exchange rate policies, such as fixed, floating, or managed exchange rates, to achieve macroeconomic objectives such as reducing unemployment. Exchange rate directly impacts inflation, economic growth, and the balance of payments. When the domestic currency appreciates, imports become cheaper. Conversely, when the currency depreciates, it can boost exports by making goods cheaper on the international market. Monetary policy authority could manipulate exchange rate to manage inflation. A strong currency reduces the cost of imports, helping lower inflation. Obstfeld and Rogoff (1995)

Akarsu (2020) explained that a depreciation in the exchange rate can enhance the competitiveness of domestic goods, thereby boosting export demand, increasing output, and raising employment levels—a process referred to as the macroeconomic channel. Through the development channel, a depreciated exchange rate may lower wages, improve profitability, and stimulate economic growth, potentially leading to higher employment. However, Rodrigues (2017), as cited by Akarsu (2020), argued that exchange rate depreciation can also contribute to rising unemployment by increasing the cost of imported intermediate and capital goods.

A study of this nature, therefore, should be conducted because to treat issues concerning the relevance of monetary policy instrument most especially exchange rate to the unemployment problem, an appropriate framework is a necessity to serve as a point of reference. Understanding the fundamental instruments of monetary policy and key policy variables like the exchange rate is essential for

effectively tackling the issue of unemployment. The choice of policy variables and instruments is very crucial in dealing with the issue of unemployment. It is an issue confronting monetary policymakers. Studies such as this are capable of providing guidelines and lessons that could be relevant and can offer a good basis for policymaking. Also, considering the huge youth unemployment in particular, a study that could examine the effect of instrument of monetary policy such as Exchange rate on unemployment of different groups like the youth and adults should be a goal for the country. Thus, a study of this nature should be conducted. Also, given the fast-rising unemployment rate in the country, a study of this nature could endue and empower the monetary policy authority to appraise and evaluate appropriately. It is safe to say that a study of this nature can set up the right framework and enable policymakers to identify and formulate policy that can reduce the unemployment of youths, adults and the aggregate unemployment level .In recent times, slowing employment growth and increasing unemployment in Nigeria have hit both youth and adult populations hard. As a result, today's unemployed are faced with an increasing deficit of decent work opportunities and high socio-economic uncertainties. Recently, the secretary general of the United Nations (UN) called upon countries to put an end to the vicious cycle of unemployment, stating that the unemployed – especially the youth are a valuable asset for our future. Over the years, successive Nigerian governments have implemented various policies and programmes aimed at reducing unemployment. Notable among these are the establishment of the National Directorate of Employment (NDE) in November 1986, which focused on skills acquisition; the National Poverty Eradication Programme (NAPEP) introduced in 2001; the Poverty Alleviation Programme (PAD) launched in June 2009; the Subsidy Reinvestment and Empowerment Programme (SURE-P); and the Youth Enterprise with Innovation in Nigeria (YouWiN) initiative in 2011. These interventions were designed to create employment opportunities and promote entrepreneurship (Agang, 2010; Ogunmuku, 2013).

Also, the interventions include the establishment of exchange markets, removal of interest rates, foreign exchange markets unification and liberalization of bank licensing in 1987. In 1989, payment of interest on demand deposits was granted to banks, while interest rate administration was introduced in 1991 (Adeoye, Ojapinwa, & Odekunle, 2014). In 2017, the CBN maintained a tight monetary policy stance by keeping the Monetary Policy Rate (MPR) or benchmark lending rate at 14.0 percent, with an asymmetric interest rate corridor of +200/-500 basis points. During this period, the Cash Reserve Ratio (CRR) and Liquidity Ratio (LR) were set at 22.5 percent and 30.0 percent, respectively. By March 2019, the Monetary Policy Committee (MPC) reduced the MPR by 50 basis points to 13.5 percent, maintaining an asymmetric corridor of +200/-500 basis points. Later, the interest rate corridor was adjusted to +100/-700 basis points around the MPR, while the CRR and LR were held at 27.5 percent and 30.0 percent, respectively (CBN, 2022).

The unemployment crises in the country seem to become apparent as the years pass by. The unemployment issue affected not just the welfare of both the youth and the adults, but also the potential performance in the long run and the economic stability of the country. There is an increasing uncertainty of the people, especially the unemployed in their hopes of experiencing a satisfactory entry to the labour market, which has had unfortunate consequences on the economy and the society at large. The high unemployment rate in the country has limited several youths and adults from contributing effectively to national development. Especially with the current economic situation, they have less to spend as consumers, and as savers, they have less to invest and oftentimes do not have the "voice" to bring about transformation in society. The existing social unrest in the country and the rejection of the extant socio-economic system are also linked to the unemployment problem the country is facing. If no precedence is given to the unemployment problem among other economic problems, the situation could degenerate to preventing the country from innovating and developing competitive advantages in terms of human capital investment, and capable of eroding prospects.

There are several empirical studies both in Nigeria and the rest of the world. Previous studies have

examined the impact of exchange rate on unemployment. In Nigeria, Okeke and Chukwu (2021). Ani, Joel, and Baajon (2019), Amasomma (2015) and Nwosa (2016) are among the studies that have examined the impact of exchange rate on the unemployment rate.

Several findings have been made in this area and have added great value to the related literature. However, all the previous studies focused on the aggregate unemployment rate. Therefore, an empirical relationship between exchange and specific demographic unemployment groups such as youth and adult unemployment has remained a gap to cover. The nature of youth unemployment is rather deferring from adult unemployment, and in most cases, are exposed to a higher risk of entering unemployment. There is a need to target policies on demographic unemployment groups. It can also play a vital role in our choice of monetary policy instruments in an attempt to influence the unemployment rate through monetary policy. It will also serve as a trajectory for efficient monetary policies and measures that can lead to inflation reduction in the country. This study intends to fill this gap by examing the impact of exchange rate youth and adult unemployment rate in Nigeria.

To achieve the objective of this study, the paper is organized in five sections as follows: Section one introduction, section two- review of empirical literature, section 3, the research method ,section 4, result presentation and findings while section 5 concludes this paper

SECTION 11

II. LITERATURE REVIEW

The literature review is divided into a review of conceptual literature, a review of basic theories, and other theoretical issues. Also, the empirical literature will be reviewed in this chapter and, will provide a summary of the literature review as well as a justification for the study.

Review of Conceptual Literature

Monetary Policy

Monetary policy refers to the strategic actions taken by a country's central bank to regulate the money supply and influence interest rates with the aim of achieving key macroeconomic objectives. These objectives typically include controlling inflation, stabilizing the currency, fostering economic growth, and promoting employment. Gul, Mughal, and Rahim (2012) emphasized that monetary policy is instrumental in managing liquidity and interest rates in line with governmental targets. Similarly, Kaur (2023) described it as a tool through which the Central Bank controls the economy's money supply and borrowing costs. According to The Economic Times (2023), monetary policy is a macroeconomic tool used to ensure price stability and support job creation by regulating the circulation of money and interest rates. The viewpoints of monetary policy might be classified into two. These are individuals who view monetary policy to be appropriate if the objective is to attain price stability. The second perspective considers monetary policy an effective instrument for achieving price stability and broader macroeconomic objectives such as full employment, balance of payments stability, and economic growth. For the purpose of this study, monetary policy is defined as a set of actions undertaken by the monetary authority to determine the conditions for money circulation within the economy and to regulate interest rates.

Monetary policy authorities, such as central banks, use a variety of tools to manage the economy, with exchange rate management being one of the most important instrument . Exchange rates affect multiple aspects of an economy, including inflation, trade balance, investment, and employment. By strategically influencing exchange rates, central banks aim to achieve objectives such as price stability, economic growth, and reducing unemployment. A depreciation or devaluation of the domestic currency reduces the relative price of a country's goods and services for international consumers, thereby enhancing export competitiveness and increasing foreign demand. Increased export demand stimulates production, particularly in sectors like manufacturing, agriculture, and mining. This can lead to reduction in unemployment as companies expand their workforce to meet growing foreign demand. In export-driven

economies, a weaker currency can directly lead to higher employment rates. For example, a weaker currency can make the cost of labor and raw materials more competitive for foreign buyers, thus increasing demand for locally produced goods, this creates new employment opportunities in export industries, it could also increase the cost of imported goods, leading to inflation. While inflation could reduce consumer purchasing power, the overall impact of a weaker currency can boost domestic demand by making locally produced goods and services more attractive. As demand for domestic goods rises, businesses are incentivized to increase production and hire more workers to meet this demand.

While exchange rate depreciation may increase inflation, if managed properly, it can also reduce unemployment by stimulating domestic consumption and investment, which are crucial for employment growth (Osakwe, 2014)

Exchange rate depreciation may increase inflation, if managed poorly, it can also reduce unemployment by stimulating domestic consumption and investment, which are crucial for employment growth. Exchange rate stability is key to attracting foreign direct investment (FDI). When a country's currency is stable or appreciating, it can signal a stable economic environment to foreign investors. This stability helps foreign investors make long-term plans, knowing that the value of their investments won't be eroded by sudden currency fluctuations. Increased FDI can lead to job creation, particularly in industries such as manufacturing, energy, and services. By maintaining a stable or moderately depreciated exchange rate, a central bank can encourage foreign capital inflows. These capital inflows lead to increased production capacity, economic growth, and subsequently, more job opportunities in the economy (Iyoha, 2016).

The central bank can also use interest rate policy in conjunction with exchange rate management. By lowering interest rates, the central bank can weaken the currency, making exports cheaper and stimulating demand. In turn, this creates employment opportunities in export-driven sectors. Similarly, raising interest rates may strengthen the currency and control inflation, indirectly affecting employment by stabilizing the economy.

Unemployment Rate

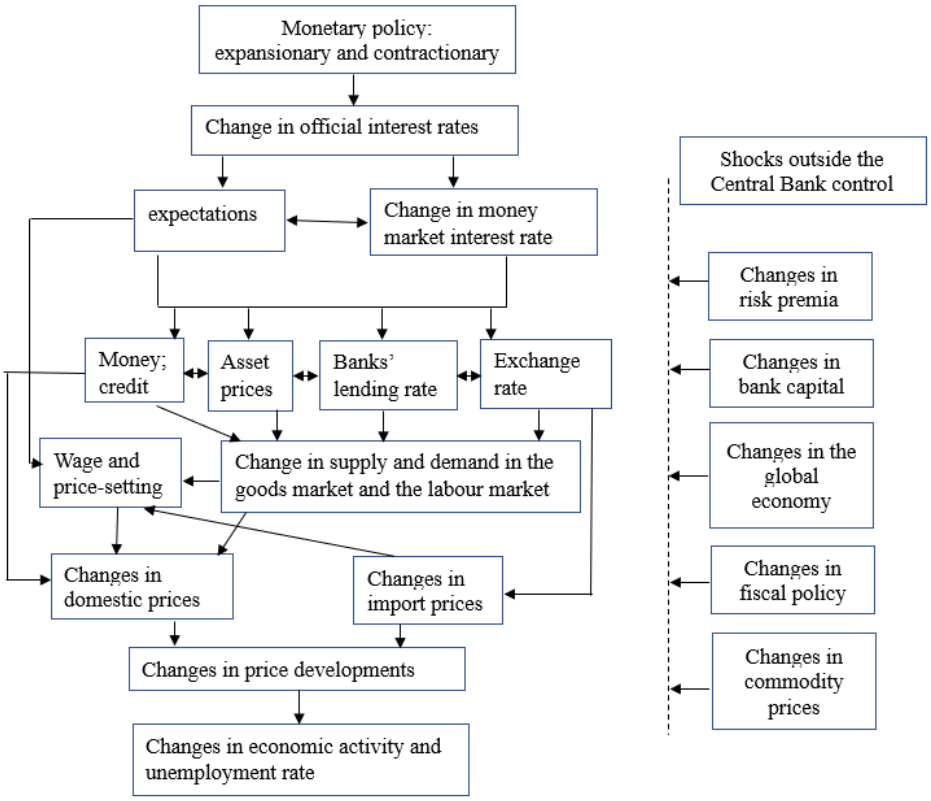
The concept of unemployment has been similarly defined by several scholars and institutions. For instance, the U.S. Bureau of Labor Statistics (2023) described unemployment as the share of the labour force that is without a job. Specifically, it refers to individuals who are currently not working, have actively sought employment within the last four weeks, and are available to work. Active job search includes actions such as contacting employers, attending interviews, submitting applications and résumés, responding to vacancies, and participating in other targeted employment-seeking activities. To be considered actively searching, an individual must have pursued such steps over the preceding four weeks and must be available for employment, except in cases of short-term illness.

Ndzwayiba (2020) described unemployment as a condition affecting individuals aged 16 and above who are capable of working, available for employment, and actively looking for jobs but remain unemployed. Chappelow (2020) similarly defined it as the situation in which people who are searching for work are unable to secure employment. According to the Australian Bureau of Statistics (2022), the unemployment rate refers to individuals of working age who are not currently employed but are actively seeking work and available to start if offered a job. Like the U.S. Bureau of Labor Statistics, the Australian Bureau explained that 'seeking employment' involves activities such as applying for jobs, attempting to start a business, or engaging in agricultural ventures within a four-week reference period. International standards also consider informal, part-time, seasonal, casual, and temporary work arrangements as part of employment-seeking efforts within a country. In the same vein, the OECD (2023) defined unemployment as individuals of working age who are jobless, available for work, and actively pursuing employment. Hayes (2023) also characterized unemployment as a condition where people who are looking for jobs are unable to find any.

For the purpose of this study, unemployment is defined as the population of individuals aged 18 years and above who are willing to work at the prevailing wage rate but are unable to secure employment. The analysis in this study considers unemployment in three dimensions: total unemployment, youth unemployment, and adult unemployment. Total unemployment, in this context, extends beyond merely accounting for individuals who have lost their jobs, encompassing all working-age persons actively seeking but unable to obtain employment. They comprise individuals who have quit or left their jobs to seek other employment, those who had temporary jobs but whose temporary job period has expired, people looking for jobs for the first time, and people who have job experience looking for jobs after being absent from the labour force as a result of reasons either within or beyond their control. Youth, following Chappelow (2020), are people in the population whose age fall within 18 years to 29 years. The International Monetary Fund – IMF (2010) also defined the unemployment rate as the percentage of the labour force that is seeking employment. Following Chappelow (2020), youth unemployment for this study is defined as people in the population whose age falls between 18 years to 29 years, and who are seeking employment. Adult unemployment comprises people above 29 years of age, who are seeking employment.

III. CONCEPTUAL FRAMEWORK

Figure 2.1: conceptual framework showing the channels through which monetary policy affects unemployment



As illustrated in the figure, fluctuations in the general price level influence overall economic activity, thereby affecting the rate of unemployment. Monetary policy operates through intermediate variables such as the money supply, bank credit, and exchange rate, which in turn impact key macroeconomic indicators like domestic inflation. Exchange rate variations influence consumption and investment decisions within the economy, subsequently shaping aggregate demand. This aggregate demand plays a crucial role in determining economic growth, price stability, and employment outcomes.

Review of Basic Theories

Exchange Rate Channel

The variations in the exchange rate directly affect consumption patterns among individuals and firms, which in turn influence the supply and demand of goods and services. In a flexible exchange rate regime, currency values are determined by market dynamics. When an expansionary monetary policy is implemented, it typically leads to currency depreciation and increased costs of imported goods and services. The exchange rate transmission mechanism can affect production, employment, and resource allocation, depending on the degree of openness of the economy and the prevailing exchange rate system. This channel operates by altering the exchange rate and, consequently, influencing aggregate demand and supply in response to monetary adjustments. For example, an increase in interest rates may cause the domestic currency to appreciate, thereby lowering the prices of imports and reducing inflationary pressures. The effectiveness of the exchange rate channel depends on factors such as the type of exchange rate regime, the extent of exchange rate pass-through, and the openness of the economy to capital movements (Taylor, 1995). In a small open economy like Nigeria that adopts a flexible exchange rate system, this channel serves as a vital conduit through which monetary policy exerts its influence.

Review of Empirical Literature

Exchange Rate and Aggregate, Youth, and Adult Unemployment Rates

Millah and Wibowo (2021) carried out a study in Indonesia to assess how monetary policy influences the unemployment rate, covering the period from 1975 to 2016. Utilizing the Autoregressive Distributed Lag (ARDL) technique, the results showed that both the real exchange rate and real interest rate had a significant negative impact on unemployment in the short run. This implies that the influence of monetary policy on unemployment was temporary rather than lasting.

In Nigeria, Okeke and Chukwu (2021) examined the effects of monetary policy tools on unemployment for the period between 1986 and 2018. Applying the ARDL approach, their findings indicated that the exchange rate and liquidity ratio negatively and significantly affected employment. Meanwhile, the cash reserve ratio and the monetary policy rate were found to have a positive, though statistically insignificant, impact on employment levels.

Ani, Joel, and Baajon (2019) explored the link between monetary policy—specifically, the exchange rate—and unemployment in Nigeria, using data from 1986 to 2017. Through the application of the ARDL method, the study found a positive relationship between exchange rate movements and the unemployment rate, suggesting that as the exchange rate fluctuated, unemployment levels were also affected.

Nwosa (2016) analyzed the effects of macroeconomic policies on unemployment in Nigeria using the Ordinary Least Squares (OLS) technique. The study, which spanned from 1980 to 2013, found a strong and direct association between the exchange rate and unemployment, reinforcing the view that exchange rate policy plays a significant role in shaping labor market outcomes.

Amasomma (2015) investigated how effective monetary policy instruments were in reducing unemployment in Nigeria between 1970 and 2013. Employing both multiple regression (OLS) and error correction modeling, the study discovered that the exchange rate and consumer price index had significant effects on unemployment. Additionally, the findings showed a one-way causality running from monetary policy to unemployment, particularly through the exchange rate channel.

Attamah, Igwe, and Ukpere (2015) focused on the joint effects of fiscal and monetary policy on unemployment in Nigeria over the period from 1980 to 2013. Using error correction models for estimation, the study found that both the exchange rate and money supply had a positive and significant impact on unemployment. However, the interest rate had a positive influence that was not statistically significant.

Only a few studies have examined the influence of monetary policy on unemployment in Nigeria and other countries, taking into account the significance of the currency rate. Hence, by examining the correlation between the exchange rate and unemployment, this research enhances the existing body of knowledge in Nigeria. Furthermore, none of the past surveys have provided a breakdown of the unemployment rate. Disaggregation unemployment rate into smaller components would provide the monetary policy authority a specific area to concentrate in addressing unemployment in the country. Furthermore, considering the rapid devaluation of the exchange rate and the significant unemployment rate, particularly among the younger population, it is necessary to analyse unemployment in a detailed manner and present concrete data about the influence of the exchange rate on unemployment at a more specific or disaggregated level.

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IV. RESEARCH METHOD

The framework of analysis is based on the Philips curve theory and Taylor's rule. Friedman (1968) and Phelps (1968) are of the view that, at the natural rate of unemployment or NAIRU, the Philips curve is vertical. "Therefore, inflation increases (decreases) when the rate of unemployment is less (higher) than its natural rate. The trade-off between inflation and unemployment is displayed by the short-run Philips curve (Van der Ploeg, 2005). Consider the accelerator Philips curve such that the inflation gap for the next period π_(t-1) is dependent on the output gap, y_t and the expected inflation is equal to the previous inflation (Van der Ploeg, 2005):

$$\pi_{t-1} = \pi_t + by_t + e_{\pi t+1} \quad \text{with } b > 0 \quad (3.1)$$

Where e_πt represents a cost-push disturbance. Systematic deviance from the NAIRU (y_t>0) induces inflation or deflation. In an alternative way, with unexpected inflation, aggregate supply increases. Aggregate demand is determined negatively by the real interest rate:

$$y_{t+1} = \vartheta y_t - a(i_t - \pi_{t+1}|t - r) + ey_{t+1} = \vartheta' y_t - a(i_t - \pi_t - r) + ey_{t+1}$$

$$0 < \vartheta < 1 \quad \vartheta' \equiv \vartheta + ba > \vartheta \qquad a > 0 \qquad (3.2)$$

The variable r denotes the long-term real interest rate, while ϑ captures the degree of persistence in the output gap. The term $e_{\gamma t}$ represents a demand-side disturbance, such as a fiscal expansion. The inflation forecast for one period ahead is expressed as $\pi_{(t+1)|t} = \pi_t + b \cdot y_t$, and the real interest rate adjusted for expected inflation becomes $i_t - \pi_{(t+1)|t} = i_t - \pi_t - b \cdot y_t$. At equilibrium, employment and output are considered efficient, implying that the optimal output gap is zero (Van der Ploeg, 2005). Solving the optimization problem based on equation (3.2) leads to the derivation of the Taylor rule, which prescribes the optimal nominal interest rate (Zhou, 2021):

$$i_t = r^* + \pi_t + f_\pi(\pi_t - \pi^*) + f_y y_t \qquad (3.3)$$

Where i_t represents the monetary authority's (Central Bank) policy interest. r^* is the equilibrium interest rate, the current inflation rate is π_t, while π^* represents the target rate of inflation the central bank sets. y_t represents the production gap. The expected value is influenced by currency loss, presented as:

$$\gamma(y_t - y_t^*)^2 + (1-\gamma)(\pi_t - \pi_t^*)^2$$
$$\gamma \in [0,1] \qquad (3.4)$$

Where (y_t- 〖y_t〗^*) is the production gap, π_t is the inflation rate at time t, while the target inflation rate is 〖π_t〗^*.

Macroeconomic policy often targets key variables such as output levels, unemployment rates, and the volatility of past outcomes in relation to their expected paths. Nonetheless, shifts in natural output

and employment are not typically treated as direct objectives of sound monetary policy (Zhou, 2021). As such, it is essential to establish a suitable inflation target that helps optimize aggregate production while minimizing fluctuations in the interest rate around its desired level.

A notable feature of the Taylor rule is that it does not aim to evaluate the overall efficiency of production; rather, it serves as a policy instrument designed to maintain production stability within a tolerable range. The rule can also be expressed using projected inflation and output gaps for the next period. By inserting equation (3.3) into equation (3.2), the framework accounts for forward-looking elements in monetary decision-making;

$$y_{t+1} = \rho_t[by_t + a(\pi_t - \pi_t^*)] + ey_{t+1} \quad (3.5)$$

Monetary disinflation (less π*) will bring about a temporary increase in the nominal rate of interest that would reduce the aggregate demand and output. A negative shock on aggregate demand – a reduction in ey depresses unemployment, that would warrant a looser monetary policy and lower inflation. A permanent shock – increase in e_π would mean inflation inducement, to be tackled with a tighter monetary policy. This would induce unemployment (Van der Ploeg, 2005). Thus, tighter monetary policy such as an increase in interest rate, reduction in money supply and currency devaluation – a rise in exchange rate would bring about an increase in unemployment and vice versa."

IV. MODEL SPECIFICATION

Our model is based on the theoretical framework discussed in section (3.1). For this study, we chose the CBN lending rate as our policy interest rate. Also, for this study, money supply and exchange rate are included as monetary policy variables. In the literature, the consumer price index (CPI) is commonly used as an indicator of inflation. In this study, CPI is used as the measurement of the degree of inflation, π_t. As regards the target rate of inflation, we use the CBN target inflation rate. As regards the production gap - y_t- 〖y_t〗 ^*, we use the Hodrick-Prescott (HP) filtering technique, to decompose the real GDP variable by minimizing the variance of fluctuation. The function form of the unemployment equation is presented as:

$$Unemp = f(LENDR, M2, EXCH, INFGAP, GDPGAP) \quad (3.6)$$

Equation (3.6) is respecified as;

$$UNEMP = \beta_0 + \beta_1 LENDR + \beta_2 M2 + \beta_3 EXCH + \beta_4 INFGAP + \beta_5 GDPGAP + e_i \quad (3.7)$$

Where:
UNEMP = unemployment rate, decomposed into aggregate unemployment rate – AUNEMP, youth unemployment rate - YUNEMP, and adult unemployment rate - ADUNEMP.
LENDR = banks' lending rate
M2 = broad money supply
EXCH = real exchange rate
INFGAP = inflation gap (π_t-π^*), the difference between actual inflation and target inflation
GDPGAP = production gap (y_t- 〖y_t〗 ^*), the difference between actual GDP and potential GDP – to be generated empirically using the HP filtering technique.

Equation (3.7) is specified in an autoregressive-distributed-lag (ARDL) model as;

$$UNEMP = \beta_0 + \beta_1 UNEMP_{t-1} + \beta_2 LENDR_{t-1} + \beta_3 M2_{t-1} + \beta_4 EXCH_{t-1} + \beta_5 INFGAP_{t-1} + \beta_6 GDPGAP_{t-1} + \sum_{t=i}^{p} \phi_1 UNEMP_{t-i} + \sum_{t=i}^{q} \phi_2 LENDR_{t-i} + \sum_{t=i}^{q} \phi_3 M2_{t-i} + \sum_{t=i}^{q} \phi_4 EXCH_{t-i} + \sum_{t=i}^{q} \phi_5 INFGAP_{t-i} + \sum_{t=i}^{q} \phi_6 IGDPGAP_{t-i} + e_i \quad (3.8)$$

Where e_iis the error term,β_i (i = 1,2,3, …6) and ϕ_i (i = 1,2,3, …6) represent the long-run and short-run coefficients of the explanatory variables, respectively. The appropriate lag length for the model is selected based on the Akaike Information Criterion (AIC).are the long and short-run parameters of the explanatory variables respectively. The optimal lag length is to be determined using the Akaike information lag length selection method.

Based on our objectives, UNEMP, the unemployment rate variable is decomposed into aggregate unemployment rate – AUNEMP, youth unemployment rate - YUNEMP, and adult unemployment rate – ADUNEMP. Therefore, to capture objective one, UNEMP, the unemployment

rate variable will be aggregate unemployment and the explanatory variables will remain as defined above. Thereafter, the aggregate unemployment rate will be substituted with the youth unemployment rate – YUNEMP and the model will be estimated again to provide the estimates for objective two. Concerning objective three, the adult unemployment rate – ADUNEMP will serve as the dependent variable, while explanatory variables will remain the same.

The ARDL model possesses desirable small sample properties, giving it an edge over comparable estimation techniques. One of its strengths is its ability to produce unbiased estimates and valid t-statistics for both short-run and long-run relationships, even when the model includes endogenous explanatory variables. Additionally, the ARDL approach remains applicable when the regressors are integrated of order zero [I(0)], order one [I(1)], or a combination of both. When evidence of cointegration among the variables is found, it suggests that the system tends toward long-run equilibrium, which can be represented within an error correction framework as follows:

$$\Delta UNEMP = \sum_{t=i}^{p} \phi_1 UNEMP_{t-i} + \sum_{t=i}^{q} \phi_2 LENDR_{t-i} + \sum_{t=i}^{q} \phi_3 M2_{t-i} + \sum_{t=i}^{q} \phi_4 EXCH_{t-i} + \sum_{t=i}^{q} \phi_5 INFGAP_{t-i} + \sum_{t=i}^{q} \phi_6 IGDPGAP_{t-i} + \varphi ECM1_{t-1} + e_i \quad (3.9)$$

Where; 〖ECM1〗_(t-1) is the error correction term

V. ESTIMATION TECHNIQUES AND PROCEDURE

The estimation process will be conducted sequentially. First, the output gap will be derived using the Hodrick-Prescott (HP) filter technique. Following this, the stationarity of the variables will be assessed using both the Augmented Dickey-Fuller (ADF) test and the Phillips-Perron (PP) unit root test. Thereafter, the model assessing the effect of the exchange rate on unemployment will be estimated. The HP filter technique divides a time series into its trend and cyclical (or residual) components. Originally introduced by Whittaker (1922) and later refined by Whittaker and Robinson (1924), the method was intended as a framework for penalized maximum likelihood estimation, offering a quantitative approach to measuring trend, referred to as "graduation" at the time (Phillips & Shi, 2019). If the level of output at time t is denoted as y_t, the production level can be expressed as follows:

$$y_t = y_t^T + y_t^c, \qquad t = 1, 2, \ldots, T \quad (3.10)$$

Where (y_t) is a time series (GDP) containing both the trend (y_t^T) and the cyclical parts (y_t^c). To obtain the trend part from the aggregate production function, it is necessary to specify a loss square function as,

$$f(\lambda) = \sum_{t-1}^{T} (y_t - y_t^T)^2 + \lambda \sum_{t-1}^{T} [(y_{t+1}^T + y_t^T) - (y_t^T + y_{t-1}^T)]^2 \quad (3.11)$$

Where λ is the smoothing parameter of the trend. The trend part is specified as a minimized loss square;

$$y_t^T = \arg min[\{f(\lambda) = \sum_{t-1}^{T} (y_t - y_t^T)^2 + \lambda \sum_{t-1}^{T} [(y_{t+1}^T + y_t^T) - (y_t^T + y_{t-1}^T)]^2\}] \quad (3.12)$$

Equation (3.12) indicates that when the smoothing parameter (λ) is assigned a very high value, the resulting trend component from the HP filter becomes nearly linear. In fact, as λ approaches infinity, the filtered trend essentially mimics a straight line. However, if the true trend is nonlinear, this can result in a distorted representation of the cyclical component due to the presence of residual trends. On the other hand, if λ is too low, the filtered trend tends to follow short-term fluctuations too closely, making it overly responsive to temporary variations in the data.

In empirical macroeconomic research, the choice of λ typically follows standard guidelines established through experimental studies. For quarterly data, Hodrick and Prescott (1997) recommended a λ value of 1600 based on U.S. economic data. This benchmark has been widely adopted. Ravn and Uhlig (2002) extended this by rescaling λ for different frequencies: suggesting 6.25 for annual data, 100 for semi-annual, and 129,600 for monthly data. For weekly and daily data, they proposed even higher values: $\lambda = 1600 \times 124$ and $\lambda = 1600 \times (365/4)$, respectively. As this study makes use of annual data, the appropriate smoothing value is $\lambda = 6.25$.

Furthermore, to estimate the ARDL model suited to the study's objectives, the OLS technique will be

applied. The optimal lag length will be determined using AIC. OLS is a widely used linear estimation method that produces unbiased estimates—meaning that the expected value of the estimator equals the actual parameter. Moreover, among all linear and unbiased estimators, OLS has the smallest possible variance, making it the most efficient and reliable choice.

The ARDL technique, developed by Pesaran, Shin, and Smith (2001), is a powerful tool for assessing long-term equilibrium relationships between variables. It uses F-tests and t-tests to determine whether a co-integrating relationship exists. One of its major advantages lies in its flexibility: it can be employed regardless of whether the variables are integrated at level I(0), first difference I(1), or a mix of both. If a long-run linkage is confirmed among the variables, the ARDL framework permits the estimation of an Unrestricted Error Correction Model (UECM), allowing each variable to be considered as the dependent variable in turn."

Data, Sources and Estimation Software

The data for this study is an annual time series data that covers from 1981 to 2021. The data for the variables will be sourced from the CBN statistical bulletin and the African Development Bank database. The Econometric software for estimation is STATA 17

SECTION IV

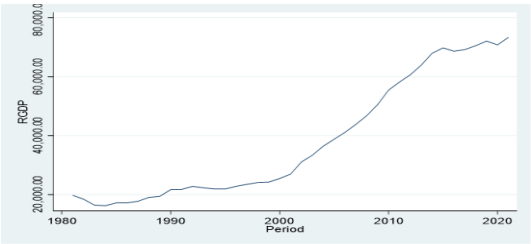
VI. RESULT PRESENTATION, ANALYSES AND DISCUSSION OF FINDINGS

The model specified in section 111 for the objective was estimated. Before estimating the regression model, the variables were analysed to see the descriptive behaviour to have an insight into the variables. The variables were also tested for unit root using the Augmented Dickey-Fuller and the Phillips-Perron tests. The ARDL Bounds test was also conducted to see the presence or otherwise of long-run relationship among the variables in the respective equations. In this section, the results are presented and the findings are discussed. We begin the section with the presentation of the HP filter result, followed by a presentation and discussion of the descriptive summary statistics of the variables and, then, unit root test results and discussion. Thereafter, a presentation, analysis and discussion of results related to the specific objective followed.

Hodrick-Prescott (HP) Filter Output

The production gap (y_t- 〖y_t〗 ^*), measured as the difference between actual real GDP and potential real GDP necessitates filtering the real GDP data. The filtering was done using the HP filtering technique. The HP filtering of the real GDP data was preceded by a plot of the real GDP data. This is to examine the presence of a trend in the real GDP data.

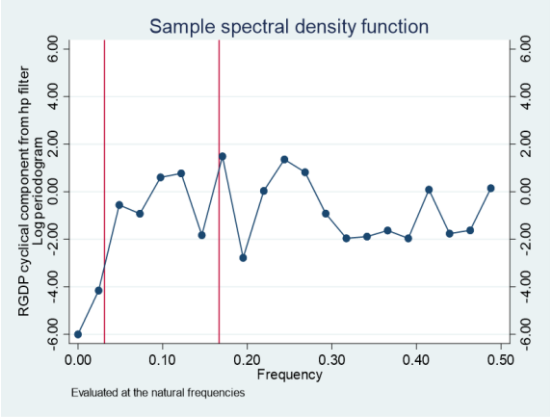
Figure 4.1: Real GDP trend



Source: Plot by the researcher

As shown in the figure, the real GDP series does not show stationarity as it does not mean reverting. Thus, it is appropriate to apply the HP filter technique, which assumes that the series or the data is non-stationary. Thus, the Hodrick–Prescott high-pass filter is used to filter the real GDP data to separate the real GDP cyclical component from the trend component. We also computed and plotted the Sample Spectral Density Function (periodogram) of the estimated cyclical component. Because the data is a yearly frequency data, we use the value of 6.25 for the smoothing parameter (λ) as discussed in the methodology section. It is necessary to plot the Sample Spectral Density Function (periodogram) because it will reveal if the filter completely removed the stochastic cycles or not. If the stochastic cycles at the unwanted frequencies are completely filtered, then, the periodogram will present a flat line at the minimum value of -6 outside the range shown by the vatical lines.

Figure 4.2: The Sample Spectral Density Function (periodogram)



Source: Plot by the researcher

The periodogram analysis revealed the presence of both low-frequency and high-frequency components. The flat line at −6.00, with points lying outside the two vertical markers, indicates that the HP filter effectively eliminated the high-frequency stochastic fluctuations from the series. Conversely, the concentration of points within the vertical lines suggests that the low-frequency cycles were not removed from the real GDP data. This outcome aligns with the nature of the Hodrick-Prescott filter, which functions as a high-pass filter—meaning it is designed to exclude high-frequency components while allowing low-frequency (long-term) fluctuations, particularly those with periodicity below 6, to remain within the cyclical component.

Descriptive Statistics of the Variables

The descriptive characteristics of the variables were examined by evaluating their mean, maximum and minimum values, skewness, and kurtosis. These measures provide insights into the statistical behaviour and distributional properties of the data. The results are presented in Table 4.1.

Table 4.1: Descriptive statistics of the variables

Variables	AUNEMP	YUNEMP	ADUNEMP	LENDR	M2	EXCH	INFGAP	GDPGAP
Mean	3.9580	9.9246	4.0835	22.3308	22.1599	108.1675	8.3394	-5.5800
Standard Deviation	0.6194	1.2564	0.6521	6.0793	14.5600	109.9115	16.6145	684.5557
Minimum value	3.0500	8.947	2.7000	10.0000	2.01	0.6100	-15.6857	-1295.271
Maximum value	6.0000	14.352	5.9990	36.0900	57.7815	399.9636	65.7588	1586.185
Skewness and Kurtosis tests for Normality								
Skewness (p-values)	0.0000	0.0000	0.0003	0.5798	0.0451	0.0101	0.0000	0.3966
Kurtosis (p-values)	0.0020	0.0014	0.0102	0.9491	0.7211	0.4817	0.0041	0.6834
Obs.	41	41	41	41	41	41	41	41

SourceComputedbytheresearcher

Unit Root Tests

The ADF and PP unit root tests were used to test for the stationarity of the variables. Before the test, the appropriate lag order was selected and the result is presented in Table 4.2

Table 4.2: Lag Order Selection

Lag-order selection criteria

Sample: 1983 thru 2021 Number of obs = 39

Lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-994.671				3.0e+12	51.419	51.5414	51.7603
1	-835.551	318.24	64	0.000	2.4e+10	46.5411	47.643	49.6123*
2	-726	219.1*	64	0.000	3.6e+09*	44.2051*	46.2865*	50.0063

* optimal lag

Endogenous: AUNEMP YUNEMP ADUNEMP LENDR M2 EXCH INFGAP GDPGAP

Exogenous: _cons

All the lag-order selection criteria are significant at lag two. This suggests the selection of lag two as the appropriate lag order. Therefore, lag 2 is used as the appropriate lag. With the identification of the lag length, we conducted a unit root test and the result is shown in Table 4.3.

Table 4.3: Unit root test results

ADF unit root test					PP unit root test				
Variable	ADF – Statistic		Lag	~I(d)	Variable	ADF – Statistic		Lag	~I(d)
	Level	1st Diff.				Level	1st Diff.		
AUNEMP	-0.053	-3.598*	2	I(1)	AUNEMP	-0.358	-6.473*	2	I(1)
YUNEMP	-1.934	-4.120*	2	I(1)	YUNEMP	-0.522	-7.093*	2	I(1)
ADUNEMP	-0.437	-9.251*	2	I(1)	ADUNEMP	-3.126	-12.303*	2	I(1)
LENDR	-2.089	-3.689*	2	I(1)	LENDR	-3.174	-8.816*	2	I(1)
M2	-3.146	-4.989*		(1)		3.190	8.554*		1)
EXCH	-0.177	-3.589*	2	I(1)	EXCH	-0.143	-4.728*	2	I(1)
INFGAP	-2.968	-4.329*	2	I(1)	INFGAP	-3.433	-6.924*	2	I(1)
GDPGAP	-1.831	-4.270*	2	I(1)	GDPGAP	-2.246	-5.761	2	I(0)

Where * indicates statistical significance at the 5% level, implying the rejection of the null hypothesis of a unit root. Lag lengths were selected based on Akaike's Final Prediction Error (FPE) criterion. The unit root tests were estimated with trend components included in the models. For the ADF test, the 5% critical values are −3.548 at level and −3.552 at first difference. For the PP test, the corresponding 5% critical values are −3.540 and −3.544 at level and first difference, respectively.

Source: Computed by the researcher

Impacts of Exchange rate on Aggregate , Youth and Adult unemployment rates

This part focuses on examining the impact of exchange rate on aggregate unemployment, youth unemployment, and adult unemployment rates. In order to begin our analysis, we utilise the Pesaran, Shin & Smith (2001) Bounds test to determine if there is a cointegration, or level form connection, among the variables in our model. The findings of the Bounds test are displayed in Table 4.4.

Table 4.4: Bounds test result for level form relationship (level effect) of the variables in the model

When the aggregate unemployment rate is the dependent variable				
Critical Values (0.1-0.01), F-statistic, Case 3				
	10%	5%	1%	p-value

	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	2.466	3.909	3.017	4.683	4.382	6.587	0.000	0.000
t	-2.4	-3.760	-2.835	-4.226	-3.629	-5.190	0.000	0.006
F = 13.467 t = -6.306								

Source: Author's computation

When the youth unemployment rate is the dependent variable								
Critical Values (0.1-0.01), F-statistic, Case 3								
	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	2.906	4.130	3.564	4.960	5.146	6.938	0.003	0.016
t	-2.5	-3.436	-2.896	-3.842	-3.628	-4.667	0.002	0.005
F = 6.381 t = -5.020								

Source: Author's computation

(c)When the adult unemployment rate is the dependent variable								
Critical Values (0.1-0.01), F-statistic, Case 3								
	10%		5%		1%		p-value	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F	2.927	4.101	3.579	4.909	5.133	6.815	0.000	0.000
t	-2.5	-3.453	-2.912	-3.851	-3.627	-4.653	0.000	0.000
F = 17.187 t = -10.043								

Source: Author's computation

Table 4.5 is structured into three columns. Column (1) presents the long-run effect of the exchange rate on overall unemployment. Column (2) displays the estimated long-run relationship between the exchange rate and youth unemployment. Lastly, Column (3) provides the long-run estimates of how the exchange rate influences adult unemployment.

Table 4.5: Long-run estimates of the model of the objective of this study

Long run statistics			
Exogenous variables	(1) Aggregate unemployment rate	(2) Youth unemployment rate	(3) Adult unemployment rate
LENDR	-0.0205 (t = -2.62) (p = 0.016)	-0.0634 (t = -2.42) (p = 0.039)	-0.0177 (t = -1.65) (p = 0.120)
M2	0.0203 (t = 4.32) (p = 0.000)	0.0127 (t = 1.53) (p = 0.159)	0.0164 (t = 5.00) (p = 0.000)
EXCH	0.0064 (t = 6.72) (p = 0.000)	0.0132 (t = 3.73) (p = 0.005)	0.0051 (t = 3.75) (p = 0.002)
INFGAP	0.0022 (t = 0.41) (p = 0.687)	0.0019 (t = 0.28) (p = 0.784)	-0.0120 (t = -4.86) (p = 0.000)
GDPGAP	6.4600 (t = 1.04) (P = 0.312)	-0.0004 (t = -3.01) (p = 0.015)	-8.3000 (t = -2.02) (p = 0.063)

Consistent with the objectives of this research, the effects of the exchange rate on aggregate, youth, and adult unemployment rates were analyzed. The findings indicate that the exchange rate positively and significantly influences all three categories of unemployment. In the first column, the coefficient of the exchange rate is estimated at 0.0064 with a t-statistic of 6.72. Given the statistical significance of the t-value, the null hypothesis that the exchange rate has no meaningful effect on aggregate unemployment is rejected at the 5% level. Specifically, a 1% increase in the exchange rate corresponds to a 0.006% rise in the aggregate unemployment rate, confirming a long-term positive association.

In the second column, the exchange rate coefficient is 0.0132, with a corresponding t-value of 3.73. This

implies that a 1% increase in the exchange rate significantly raises the youth unemployment rate by approximately 0.01%. Hence, the exchange rate exerts a notable long-run influence on youth unemployment.

For adult unemployment, as shown in column (3), the exchange rate coefficient stands at 0.0051, accompanied by a t-value of 3.75. This statistically significant result warrants rejecting the null hypothesis of no impact at the 5% threshold. Concretely, a 1% increase in the exchange rate translates into a 0.01% rise in adult unemployment over the long term.

Additionally, short-run dynamics were explored, with the outcomes summarized in Table 4.6. Column (1) presents the short-term effect of exchange rate movements on total unemployment. Column (2) captures the short-run effect on youth unemployment, while column (3) details the corresponding impact on adult unemployment."

"Table 4.6: Short-run estimates of the model for objectives one, two and three

Short-run statistics			
Exogenous variables	(1) Aggregate unemployment rate	(2) Youth unemployment rate	(3) Adult unemployment rate
LENDR	-0.0155 (t = -2.72) (p = 0.013)	0.0052 (t = 0.39) (p = 0.704)	-0.0098 (t = -2.00) (p = 0.066)
M2	0.0089 (t = 5.59) (p = 0.000)	0.0112 (t = 3.90) (p = 0.004)	0.0051 (t = 3.76) (p = 0.002)
EXCH	0.0048 (t = 5.07) (p = 0.000)	0.0107 (t = 5.99) (p = 0.000)	0.0039 (t = 4.04) (p = 0.001)
INFGAP	-0.0014 (t = -0.80) (p = 0.431)	0.0016 (t = 0.64) (p = 0.538)	-0.0037 (t = -2.33) (p = 0.035)
GDPGAP	-0.0013 (t = -5.25) (P = 0.000)	-0.0026 (t = -3.36) (p = 0.008)	-0.0009 (t = -5.75) (0.000)
Adjustment (ECM)	-0.7531 (t = -6.31) (p = 0.000)	-0.6883 (t = -4.42) (p = 0.000)	-0.1781 (t = -4.08) (p = 0.000)
Constant	2.7051 (t = 6.14) (p = 0.000)	-4.2825 (t = -1.13) (p = 0.286)	1.0584 (t = 1.23) (p = 0.238)

Source: computed by the researcher

As shown in column (1), the exchange rate carries a coefficient of 0.0048 and a t-statistic of 5.07. This suggests that a 1% rise in the exchange rate results in a 0.004% increase in overall unemployment, and the significance of the t-value confirms the rejection of the null hypothesis at the 5% level. Thus, exchange rate volatility has a noticeable short-run effect on total unemployment. In column (2), focusing on youth unemployment, the coefficient of 0.0107 and a t-value of 5.99 indicate that a 1% depreciation in the currency causes a 0.01% increase in youth joblessness in the short term. This relationship is both positive and statistically meaningful, implying that exchange rate fluctuations significantly affect young job seekers more strongly. Lastly, column (3) presents a coefficient of 0.0039 for adult unemployment, accompanied by a t-value of 4.04. The significance of this result confirms the rejection

of the null hypothesis at the 5% level. In this case, a 1% depreciation in the exchange rate contributes to a 0.004% rise in adult unemployment. This demonstrates that changes in the exchange rate also have a substantial and adverse short-run influence on the adult labour force.

Table 4.7: Diagnostics of the model for objective.

Diagnostics	(1) Aggregate unemployment rate	(2) Youth unemployment rate	(3) Adult unemployment rate
R-squared	0.8804	0.8741	0.8869
Adj. R-squared	0.7950	0.7962	0.8664
F-statistic	6.08 (p = 0.0000)	12.52 (p = 0.0002)	48.02 (p = 0.0000)
Durbin–Watson	2.2405	2.2811	2.4943
Breusch–Godfrey LM test	1.376 (p = 0.2408)	3.023 (p = 0.0821)	1.708 (p = 0.4300)
Breusch–Pagan/Cook–Weisberg test	1.01 (p = 0.4453)	1.16 (p = 0.2823)	1.34 (p = 0.2467)

VII. DISCUSSION OF FINDINGS AND POLICY IMPLICATION

In alignment with the study's objective, the exchange rate was found to exert a positive and statistically significant influence on aggregate, youth, and adult unemployment rates over both the short and long term. This suggests that depreciation in the exchange rate tends to worsen unemployment levels across all categories rather than improve them. Ordinarily, a depreciation of the real exchange rate is expected to stimulate exports, thereby raising GDP and creating jobs. However, the evidence from this study indicates that increases in the exchange rate lead to higher prices, which in turn reduce aggregate demand for goods and services—ultimately aggravating unemployment. Given the observed positive correlation between the real exchange rate and unemployment across all categories (aggregate, youth, and adult), a key policy implication is that Nigeria would benefit more from an appreciating exchange rate. Similar conclusions were drawn by Benazić and Rami (2016) in Croatia, as well as by Ani, Joel, and Baajon (2019), Nwosa (2016), and Attamah, Igwe, and Ukpere (2015). Conversely, Wibowo (2021) reported opposing results. The findings further highlight that a rising exchange rate is ineffective in tackling youth and adult unemployment, largely because higher exchange rates raise the cost of goods and services, thereby suppressing demand. Consequently, a strategy that supports exchange rate appreciation could be more effective in reducing unemployment in Nigeria. However, attempts to sustain such appreciation may introduce appreciation pressures in the foreign exchange market. To manage this, it is essential to monitor money supply carefully—particularly through targeted foreign exchange interventions—to ease such pressures and promote exchange rate stability.

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