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UNEMPLOYMENT HYSTERESIS IN NIGERIA: THE ROLE OF GOVERNMENT EXPENDITURE

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Abstract

The levels of unemployment have notably remained elevated and persistent in Nigeria. Drawing on the theoretical concepts of hysteresis and the natural rate hypotheses, unemployment was suspected to exhibit hysteric behaviour. Government expenditure, often utilized as a fiscal policy tool to address unemployment, was considered a potential catalyst for hysteresis in unemployment rates. To substantiate these assumptions, this study investigated the role of government expenditure in the hysteresis of unemployment in Nigeria from 1970 to 2022. The study employed unit root tests with structural breaks and Markov-Switching regression analysis to assess the presence of hysteresis in Nigeria's unemployment rates. Additionally, a standard Vector Autoregressive Model (VAR) was employed to examine the direct impact of government expenditure on unemployment and inflation in Nigeria, shedding light on the implied role of government spending in the hysteresis of these economic indicators. The unit root results indicated the presence of hysteresis in Nigeria's unemployment. Markov-Switching regression results suggested substantial differences between the first and second regimes of the unemployment rate in Nigeria, with potential shifts between low and high unemployment. The VAR results revealed that changes in government expenditure in Nigeria would negatively influence the unemployment rate, with the effect diminishing over time but perceived as permanent. Hence, unemployment in Nigeria exhibits hysteric behaviour. Recommendations include sustaining efforts to keep unemployment rates low, focusing on determinants like domestic investment and ease of doing business. Lastly, strengthening institutions to prevent resource mismanagement is also emphasized.

Keywords: Unemployment, Government Expenditure, Hysteresis, VAR

JEL Codes: C10, C50, E24, E62, H50, J64

1. Introduction

Unemployment constitutes a major challenge to global economic growth and development, particularly in low and medium-income countries. In Nigeria, the behaviours of this important macroeconomic variable have been unfavourable to the country's development (Ademola, Olamide, & Olayinka, 2016). Some

countries have been able to keep unemployment at a tolerable rate while others (like Nigeria) seem to be struggling with it. In truth, some people are always willing and able to work but are unable to find job in free-market economies (Mankiw, 2010). Policymakers in developing and developed nations are greatly concerned about the experience, which worsens crime rates, intensifies social unrest and unhappiness, depletes human capital, and has disastrous consequences for economic welfare. Unemployment rates in Nigeria have followed an upward trend from 1970 to 2021 with persistent tendencies to remain high and above tolerable thresholds. The Government has intervened over a period of 40 years to tackle the menace of unemployment chiefly through government expenditure. Nigeria recorded upsurge in government expenditure in 2004, a 90.75% increase in 2007, and a 61.58% rise in 2020. This shows that Nigeria's government expenditure has risen over the years from ₦2.47 billion in 1981 to ₦13.43 trillion in 2020 (World Bank, 2021). By implication, a steady rise in government expenditure in Nigeria ordinarily suggests that unemployment rate should have returned to their tolerable position (less than 3%). The persistence of this macroeconomic variables beyond their tolerable threshold suggests that there might be more to them than government expenditure can explain.

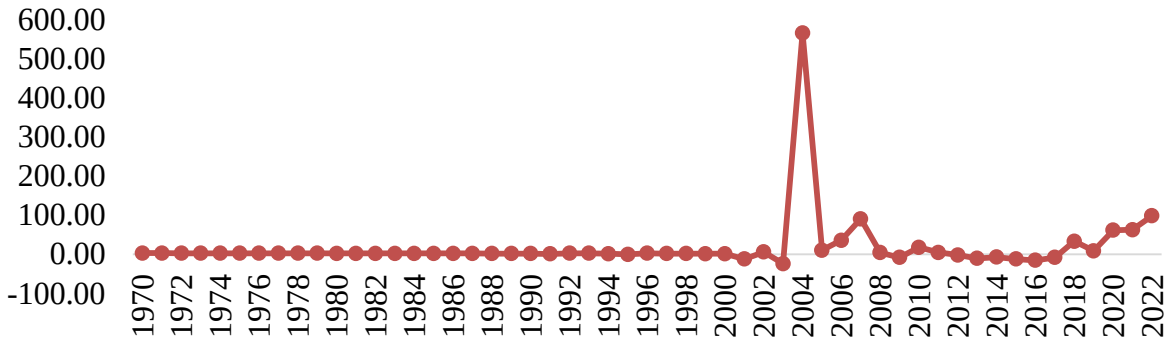

Figure1.1: Government expenditure in Nigeria, (1981 to 2022)
Source: World Bank (2022).

Regarding how to explain unemployment, there are two primary theories. The first one is the non-accelerating inflation rate of unemployment (NAIRU) hypothesis. It describes the dynamics of unemployment as a stationary process that is compatible with a steady inflation rate. The unemployment rate should, in other words, fluctuate around a long-run steady state. The Hysteresis hypothesis, which asserts that changes in unemployment may remain over time once they are consistently impacted by cyclical oscillations, is the second theory. The NAIRU theory, first proposed by Phelps and Friedman in 1967 and 1968, was successful in explaining unemployment's behaviour to a satisfactory level. However, it started to come under scrutiny in the decades that followed as a result of the ongoing shifts in unemployment rates seen globally. This led to the

introduction of the Hysteresis hypothesis by Blanchard and Summers (1986). The key implications of hysteresis are remanence, in that the application and reversal of a shock will not be followed by a return to the status quo ante; and selective memory, indominated extremum values being wiped (Cross, et al., 1998). Standard economic analysis assumes that economic equilibria are homeostatic, in that the reversal or removal of a temporary shock will be accompanied by a return to the initial equilibrium. The presence of hysteresis implies that temporary shocks can change the structural dynamics which help determine equilibrium unemployment (Amable, et al., 1995). Contrary to the natural rate concept, the process that establishes equilibrium unemployment includes the spontaneous fluctuations linked to the peaks and valleys of actual unemployment.

In a developing country, one paramount role of government expenditure is the reduction of unemployment (Bhatia, 2002). In contrast to the natural rate hypothesis, this means that the fluctuations in real unemployment are a natural component of the process that establishes equilibrium unemployment. The rising cost of governance remained a challenge for African countries; the public expenditure size has expanded which has generated interest in both the developed and developing world to optimize the size of government (Onuoha & Agbede, 2019). Government spending has gained more significance as a result of the necessity to provide employment opportunities in order to support the growing population. When the government creates employment chances through the provision of social and economic infrastructure facilities in the economy, employment is created. Government spending can raise employment levels and lower unemployment in both developed and developing nations (Estache, et al., 2013); Holden & Sparrman, 2013; Faramarzi, et al., 2014; Carmignani, 2014).

One could easily expect government expenditure to have solved the problem of unemployment in Nigeria. However, unemployment has rather persisted, increasing steadily above the natural rate (World Bank Development Indicators, 2020). Though unemployment is a result of many factors, two things could be responsible for its persistent increase in Nigeria despite the high volume of government expenditure. First, hysteresis could be present in unemployment in Nigeria which defiles all government efforts to return it to the natural rate. Second, the government might have failed to use its expenditure in such a way as to create jobs and mitigate the problem of persistent unemployment, whichever cause is true is still a subject of empirical investigation. It is against this background that this paper examined the role government expenditure played in unemployment hysteresis in Nigeria.

2. Review of Related Literature

2.1 Conceptualization

This section discusses terms as well as working definitions of operation words in the paper such as unemployment, hysteresis, unemployment hysteresis, and government expenditure.

Unemployment

The International Labour Organization (2009) defined unemployment as a state of

joblessness that occurs when people are without jobs and they have actively sought work within the past four weeks. The organization stated that unemployment is a measure of the prevalence of unemployment and it is calculated as a percentage by dividing the number of unemployed individuals by individuals currently in the labour force. According to Aminu and Anono (2012), unemployment was defined as the total number of people who are willing and able to work and make themselves available for jobs at the prevailing wage but no work for them. This suggests that the country's unemployment rate is a state of unemployment.

Jhingan (2003) states that the number of people who are unemployed in an economy, frequently expressed as a proportion of the labour force, can be thought of as the term unemployment. The amount of people who are willing, able, and available to work at the going rate but cannot find employment is another definition of unemployment. These definitions indicate that for an economic phenomenon to be referred to as unemployment, there must be some persons who are prepared to work at the prevalent wage rate and have made themselves available to work, but cannot find work.

Hysteresis

Hysteresis originates in Greek, the phrase permanent effects (in terms of magnetism) was first used in scientific explanations by the physicist Ewing (1881) to describe effects that persist after the initial source (the application of a magnetizing force) is removed. Hysteresis is described by Terry (2000) in terms of linear systems of equations that have unit roots (for differential equations) or zero roots (for difference equations). This would imply that present unemployment/inflation depends on prior unemployment values with coefficients that amount to 1 if unemployment and inflation hysteresis were applied. This is the position held by Blanchard and Summers (1986), although they are willing to use the term hysteresis more broadly to include situations when the sum of the coefficients is almost equal to 1, but not definitely 1. Others, including Layard, Nickell, and Jackman (1991), make the distinction between partial and pure hysteresis (where the sum of the coefficients is less than 1).

Unemployment Hysteresis

Unemployment hysteresis refers to a phenomenon in economics where the past level of unemployment has a persistent and lasting impact on the current and future unemployment rate. In other words, it suggests that the history of unemployment in an economy can influence its current and future employment conditions. Gali, (2020) asserted that unemployment can leave a lasting mark on the economy, making it more difficult to reduce unemployment rates even when economic conditions improve. Factors contributing to unemployment hysteresis may include skills atrophy among the long-term unemployed, discouraged workers exiting the labour force, and a decrease in the overall efficiency of the labour market.

This concept challenges the traditional economic view that labour markets naturally revert to a state of equilibrium over time. Instead, unemployment hysteresis suggests that economic downturns can have lasting effects on the labour market, making it

important to consider the historical context when analysing and addressing unemployment issues.

Government Expenditure

The term government expenditure describes the costs expended by the government in carrying out its duties, including, but not limited to, the provision of social services and defence. Existing budgets take this into account. These budgets indicate how much will be spent and how much money will be extracted from the stream of private spending by taxation (Everett, 2011). In a similar vein Osuji, Ehirim, Ukoha and Anyanwu (2017) refers to government spending from revenues derived from taxes and other sources.

2.2 Empirical Literature Review

This section vividly explore literature on unemployment hysteresis and the role played by government expenditure on unemployment hysteresis in Nigeria. To situate the gap in literature the paper considered recent literature from Nigeria, Sub-Saharan Africa and beyond. For instance, Meloni, Romaniello, and Stirati (2021) investigated the new long-term unemployment-based Keynesian theory for hysteresis. The researchers first looked at its logical premises, which claimed that rehiring long-term unemployed people would be impossible without escalating inflation. After that, they empirically evaluated the validity of their findings by focusing on periods of sustained long-term unemployment decreases and looking into the reversibility of long-term unemployment to see if inflationary impacts were there. Using a panel of 25 Organization for Economic Cooperation and Development (OECD) countries from 1983 to 2016, the result showed that the evolution of the long-term unemployment rate is almost completely synchronous with the dynamics of the total unemployment rate. Also, there are no indications of accelerating or persistently higher inflation during and after episodes of strong declines in the long-term unemployment rate. The study was able to cover the inflation-unemployment trade-off and unemployment hysteresis. However, the hysteresis of inflation was not explored, neither was the role of government expenditure.

Watson and Tervala (2021) simulated a small open economy Two Agent New Keynesian (TANK) model featuring learning by doing in production whereby changes in employment generate hysteresis in productivity and output. Their study found that credit constraints and hysteresis amplify the efficacy of fiscal stimulus in a small open economy with a floating exchange rate and inflation targeting central bank, welfare multipliers could be positive, and the degree of hysteresis, output and employment multipliers match empirical evidence well. They stated that fiscal stimulus helps reverse output hysteresis, and price-level targeting provides superior macroeconomic stabilization compared to other simple monetary rules combined with fiscal stimulus. Though the study focused on hysteresis and fiscal stimulus (government expenditure), the context of hysteresis considered in the study differs from the focus of the present study. This study looks at hysteresis in the context of inflation and unemployment.

Hanan and Rasha (2020) empirically examined the impact of government expenditure on the unemployment rate in

Egypt during the period of 1980 to 2017. They also examined whether the difference between discretionary and nondiscretionary government spending had any bearing on how unemployment was affected. The study used a vector error correction model (VECM) to investigate the dynamic short and long-run effects, and the Johansen cointegration test to determine whether a long-run equilibrium relationship existed among the variables. The empirical results of the research revealed that increasing government expenditure caused an increase in the unemployment rate in the long run. Both discretionary expenditures and nondiscretionary expenditures increase the growth of unemployment by approximately the same coefficient.

Ndubueze, Okoli, Onwuka and Mba (2020) examined the effect of government social expenditure on unemployment in Nigeria from 1981 to 2016. Using the ordinary least square (OLS) method, the result revealed that government recurrent expenditure does not have significant impact on unemployment in Nigeria, whereas capital expenditure does. Also, the study found a significant effect of health and education expenditures on unemployment in Nigeria. Fosu (2019) examined the impact of government expenditure on unemployment in 34 sub-Saharan African countries for the period 1990 to 2017. The pooled OLS, fixed effect, and random effect models revealed that both government consumption expenditure and government investment expenditure had impacts on unemployment in the SSA nations. The study concludes that higher government spending on consumption causes higher unemployment, whereas a rise in government investment expenditures results in a reduction in unemployment. Without taking into account the hysteresis hypothesis, the study merely looked at the connection between government spending and unemployment, not at how spending by the government affected employment hysteresis.

Ebi and Ibe (2019) examined the causal relationship between government expenditure and unemployment from 1981 to 2017. Recurrent and capital expenditures made up the breakdown of government spending and the findings showed that unemployment rate, recurrent expenditure, and capital expenditure had an equilibrium relationship over the long run while recurrent expenditure and unemployment rate had a negative and substantial association. On the other side, there was a positive and substantial association between unemployment rate and capital expenditure. The results of the study suggest that a change in government spending would affect unemployment rate. The impact would be negative if the change occurs in recurrent government expenditure, and negative if the change occurs in government capital expenditure. The study ignored inflation and hysteresis which are core to the present study. Nsenga, et al. (2018) carried out a study on determining whether unemployment rates in 8 newly industrialized economies conform to the natural rate hypothesis or the hysteresis hypothesis. They employed quarterly data from 2002:Q1 and 2017:Q1. In their findings, conventional unit root tests which neither account for asymmetries or structural breaks produced the most inconclusive results. On the other hand, tests which incorporate structural breaks while ignoring asymmetries tended to favour the natural rate hypothesis. However,

simultaneously accounting for asymmetries and unobserved structural breaks seemingly produced the most robust findings and confirmed hysteresis in all unemployment rates except for the Asian economies/countries of Thailand and the Philippines.

Previous studies reviewed revealed that a good number of findings have been documented empirically about unemployment, hysteresis and government expenditure. The link between government expenditure and unemployment has also been empirically exploited. However, these studies were generally silent on the issue of hysteresis. Again, the differences in time and methodology are other unique features of this study compared to previous ones. While some findings can be labelled outdated, others were found using methodologies inappropriate for a study of this nature. Due to expected interdependencies among unemployment and government expenditure, it is a methodological error to make use of models such as OLS, ARDL, in examining their relationships. This study therefore deployed vector autoregressive model which is a strong technique with the ability of explaining interdependencies.

3 Study Methodology and Model Specification

This study adopts time series data from World Development Indicators and the study carried out preliminary test such as descriptive statistics, the ADF unit root test with and without structural breaks. Further, within the vector autoregressive (VAR) framework the study examined the unemployment hysteresis with the aid of Markov Switch Regression analysis. Impulse response and variance decomposition analysis is used to determined deviation from the natural state of unemployment.

The Keynes's theory of fiscal stimulus (government expenditure) claims that an increase in government spending eventually results in increased economic activity and additional spending. The theory further states that spending boosts aggregate output and generates more income. The added business activity obviously creates more employment opportunities. This statement is express in function form as:

$$UNr = f(GEXP) \quad (3.1)$$

Where, UNr is unemployment rate and GEXP is government expenditure. The control variables such as inflation rate (INFL), gross domestic product (GDP), household consumption expenditure (HCE) and domestic investment (DIV) are included in Equation 3.1 to give:

$$UNr = f(INFL, GDP, HCE, DIV, GEXP) \quad (3.2)$$

Time series (variables) influence each other, the relationships among them can be studied using a vector autoregression (VAR). Each variable is represented in the VAR model as a linear combination of its own past values and the past values of the other variables in the system. A statistical model called vector autoregression is used to depict the relationship between various quantities as they change over time. A VAR model is also good for forecasting and policy analysis.

Using (p) as the ideal lag length, the following model:
is the expression for a general VAR (p)

$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \cdots + A_p Y_{t-p} + \varepsilon_t \quad (3.3)$$

Where $A_1 - A_p$ are coefficient matricesatlags 1, 2, …, t;Y_t is the matrix of endogenous variables at current value, and $Y_{t-1} - Y_{t-p}$ are matrices of endogenous variables at lags 1 to p.

The VAR(p) model can be specified as follows;

$$\begin{aligned} UNr_t = {} & \Pi_{11}^1 UNr_{t-1} + \Pi_{12}^1 INFL_{t-1} + \Pi_{13}^1 GDP_{t-1} + \Pi_{14}^1 HCE_{t-1} \Pi_{15}^1 DIV_{t-1} + \Pi_{16}^1 GEXP_{t-1} \\ & + \Pi_{11}^2 UNr_{t-2} + \Pi_{12}^2 INFL_{t-2} + \Pi_{13}^2 GDP_{t-2} + \Pi_{14}^2 HCE_{t-2} + \Pi_{15}^2 DIV_{t-2} \\ & + \Pi_{16}^2 GEXP_{t-2} + \cdots + \Pi_{11}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{12}^{p} INFL_{t-\mathrm{p}} + \Pi_{13}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{14}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{15}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{16}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{1t} \end{aligned} \quad (3.4)$$

$$\begin{aligned} INFL_t = {} & \Pi_{21}^1 UNr_{t-1} + \Pi_{22}^1 INFL_{t-1} + \Pi_{23}^1 GDP_{t-1} + \Pi_{24}^1 HCE_{t-1} \Pi_{25}^1 DIV_{t-1} + \Pi_{26}^1 GEXP_{t-1} \\ & + \Pi_{21}^2 UNr_{t-2} + \Pi_{22}^2 INFL_{t-2} + \Pi_{23}^2 GDP_{t-2} + \Pi_{24}^2 HCE_{t-2} + \Pi_{25}^2 DIV_{t-2} \\ & + \Pi_{26}^2 GEXP_{t-2} + \cdots + \Pi_{21}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{22}^{p} INFL_{t-\mathrm{p}} + \Pi_{23}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{24}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{25}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{26}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{2t} \end{aligned} \quad (3.5)$$

$$\begin{aligned} GDP_t = {} & \Pi_{31}^1 UNr_{t-1} + \Pi_{32}^1 INFL_{t-1} + \Pi_{33}^1 GDP_{t-1} + \Pi_{34}^1 HCE_{t-1} \Pi_{35}^1 DIV_{t-1} + \Pi_{36}^1 GEXP_{t-1} \\ & + \Pi_{31}^2 UNr_{t-2} + \Pi_{32}^2 INFL_{t-2} + \Pi_{33}^2 GDP_{t-2} + \Pi_{34}^2 HCE_{t-2} + \Pi_{35}^2 DIV_{t-2} \\ & + \Pi_{36}^2 GEXP_{t-2} + \cdots + \Pi_{31}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{32}^{p} INFL_{t-\mathrm{p}} + \Pi_{33}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{34}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{35}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{36}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{3t} \end{aligned} \quad (3.6)$$

$$\begin{aligned} HCE_t = {} & \Pi_{41}^1 UNr_{t-1} + \Pi_{42}^1 INFL_{t-1} + \Pi_{43}^1 GDP_{t-1} + \Pi_{44}^1 HCE_{t-1} \Pi_{45}^1 DIV_{t-1} + \Pi_{46}^1 GEXP_{t-1} \\ & + \Pi_{41}^2 UNr_{t-2} + \Pi_{42}^2 INFL_{t-2} + \Pi_{43}^2 GDP_{t-2} + \Pi_{44}^2 HCE_{t-2} + \Pi_{45}^2 DIV_{t-2} \\ & + \Pi_{46}^2 GEXP_{t-2} + \cdots + \Pi_{41}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{42}^{p} INFL_{t-\mathrm{p}} + \Pi_{43}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{44}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{45}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{46}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{4t} \end{aligned} \quad (3.7)$$

$$\begin{aligned} DIV_t = {} & \Pi_{51}^1 UNr_{t-1} + \Pi_{52}^1 INFL_{t-1} + \Pi_{53}^1 GDP_{t-1} + \Pi_{54}^1 HCE_{t-1} \Pi_{55}^1 DIV_{t-1} + \Pi_{56}^1 GEXP_{t-1} \\ & + \Pi_{51}^2 UNr_{t-2} + \Pi_{52}^2 INFL_{t-2} + \Pi_{53}^2 GDP_{t-2} + \Pi_{54}^2 HCE_{t-2} + \Pi_{55}^2 DIV_{t-2} \\ & + \Pi_{56}^2 GEXP_{t-2} + \cdots + \Pi_{51}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{52}^{p} INFL_{t-\mathrm{p}} + \Pi_{53}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{54}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{55}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{56}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{5t} \end{aligned} \quad (3.8)$$

$$\begin{aligned} INFL_t = {} & \Pi_{21}^1 UNr_{t-1} + \Pi_{22}^1 INFL_{t-1} + \Pi_{23}^1 GDP_{t-1} + \Pi_{24}^1 HCE_{t-1} \Pi_{25}^1 DIV_{t-1} + \Pi_{26}^1 GEXP_{t-1} \\ & + \Pi_{21}^2 UNr_{t-2} + \Pi_{22}^2 INFL_{t-2} + \Pi_{23}^2 GDP_{t-2} + \Pi_{24}^2 HCE_{t-2} + \Pi_{25}^2 DIV_{t-2} \\ & + \Pi_{26}^2 GEXP_{t-2} + \cdots + \Pi_{21}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{22}^{p} INFL_{t-\mathrm{p}} + \Pi_{23}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{24}^{\mathrm{p}} HCE_{t-\mathrm{p}} \\ & + \Pi_{25}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{26}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{1t} \end{aligned} \quad (3.9)$$

$$GEXP_t = \Pi_{61}^1 UNr_{t-1} + \Pi_{62}^1 INFL_{t-1} + \Pi_{63}^1 GDP_{t-1} + \Pi_{64}^1 HCE_{t-1} \Pi_{65}^1 DIV_{t-1} + \Pi_{66}^1 GEXP_{t-1} + \Pi_{61}^2 UNr_{t-2} + \Pi_{62}^2 INFL_{t-2} + \Pi_{63}^2 GDP_{t-2} + \Pi_{64}^2 HCE_{t-2} + \Pi_{65}^2 DIV_{t-2} + \Pi_{66}^2 GEXP_{t-2} + \cdots + \Pi_{61}^{\mathrm{p}} UNr_{t-\mathrm{p}} + \Pi_{62}^{p} INFL_{t-\mathrm{p}} + \Pi_{63}^{\mathrm{p}} GDP_{t-\mathrm{p}} + \Pi_{64}^{\mathrm{p}} HCE_{t-\mathrm{p}} + \Pi_{65}^{\mathrm{p}} DIV_{t-\mathrm{p}} + \Pi_{66}^{\mathrm{p}} GEXP_{t-\mathrm{p}} + \varepsilon_{6t} \quad (3.10)$$

The VAR (p) model is expressed as follows:

$$UNr_t = \Pi_0 + \Pi_1 \sum_{i=0}^{p} UNr_{t-i} + \Pi_2 \sum_{i=0}^{p} INFL_{t-i} + \Pi_3 \sum_{i=0}^{p} GDP_{t-i} + \Pi_4 \sum_{i=0}^{p} HCE_{t-i} + \Pi_5 \sum_{i=0}^{p} DIV_{t-i} + \Pi_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{1\mathrm{t}} \quad (3.11)$$

$$INFL_t = \alpha_0 + \alpha_1 \sum_{i=0}^{p} UNr_{t-i} + \alpha_2 \sum_{i=0}^{p} INFL_{t-i} + \alpha_3 \sum_{i=0}^{p} GDP_{t-i} + \alpha_4 \sum_{i=0}^{p} HCE_{t-i} + \alpha_5 \sum_{i=0}^{p} DIV_{t-i} + \alpha_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{2\mathrm{t}} \quad (3.12)$$

$$GDP_t = \beta_0 + \beta_1 \sum_{i=0}^{p} UNr_{t-i} + \beta_2 \sum_{i=0}^{p} INFL_{t-i} + \beta_3 \sum_{i=0}^{p} GDP_{t-i} + \beta_4 \sum_{i=0}^{p} HCE_{t-i} + \beta_5 \sum_{i=0}^{p} DIV_{t-i} + \beta_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{3\mathrm{t}} \quad (3.13)$$

$$HCE_t = \gamma_0 + \gamma_1 \sum_{i=0}^{p} UNr_{t-i} + \gamma_2 \sum_{i=0}^{p} INFL_{t-i} + \gamma_3 \sum_{i=0}^{p} GDP_{t-i} + \gamma_4 \sum_{i=0}^{p} HCE_{t-i} + \gamma_5 \sum_{i=0}^{p} DIV_{t-i} + \gamma_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{4\mathrm{t}} \quad (3.14)$$

$$DIV_t = \delta_0 + \delta_1 \sum_{i=0}^{p} UNr_{t-i} + \delta_2 \sum_{i=0}^{p} INFL_{t-i} + \delta_3 \sum_{i=0}^{p} GDP_{t-i} + \delta_4 \sum_{i=0}^{p} HCE_{t-i} + \delta_5 \sum_{i=0}^{p} DIV_{t-i} + \delta_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{5\mathrm{t}} \quad (3.15)$$

$$GEXP_t = \theta_0 + \theta_1 \sum_{i=0}^{p} UNr_{t-i} + \theta_2 \sum_{i=0}^{p} INFL_{t-i} + \theta_3 \sum_{i=0}^{p} GDP_{t-i} + \theta_4 \sum_{i=0}^{p} HCE_{t-i} + \theta_5 \sum_{i=0}^{p} DIV_{t-i} + \theta_6 \sum_{i=0}^{p} GEXP_{t-i} + \varepsilon_{6\mathrm{t}} \quad (3.16)$$

4. Result Presentation and Discussion

4.1 Descriptive Statistics

Table 4.1: Descriptive Statistics

	DIV	GDP	GEXP	HCE	INFL	UNR
Mean	1.75E+13	3.28E+13	5.61E+12	2.48E+13	18.04258	4.045868
Median	1.49E+12	4.09E+12	3.72E+10	2.41E+13	12.87658	3.931667
Maximum	5.99E+14	2.02E+14	2.00E+14	6.02E+13	72.83550	5.999000
Minimum	8.71E+10	8.96E+09	3.63E+08	8.33E+12	3.457650	3.700000
Std. Dev.	8.16E+13	5.21E+13	2.72E+13	1.32E+13	15.09797	0.470864
Skewness	6.873695	1.670968	6.938526	0.570604	2.025140	3.028068
Kurtosis	49.12222	4.780279	49.76282	2.362460	6.370808	11.69496

Jarque-Bera	20460.20	126.6517	21017.45	15.09452	245.2763	991.7986
Probability	0.000000	0.000000	0.000000	0.000528	0.000000	0.000000

Source: E-views 10 Output

Table 4.1 presents the descriptive statistics of the variables, showing the following averages: DIV at ₦1.75 trillion, GDP at ₦3.28 trillion, GEXP at ₦5.61 trillion, HCE at ₦2.48 trillion, INFL at 18.04%, and UNR at 4.04%. In 2022, Nigeria experienced the highest DIV at ₦59.9 trillion and the lowest in 1985 at ₦8.71 billion, indicating significantly more DIV in 2022. The highest GDP of ₦20.2 trillion was recorded in 2022, with the lowest of ₦8.09 billion in 1970, reflecting the fastest economic growth in 2022. Government expenditure (GEXP) was also highest in 2022 at ₦20.0 trillion, compared to the lowest of ₦3.63 million in 1970, suggesting aggressive government spending in 2022. Household consumption expenditure (HCE) peaked at ₦60.2 trillion in 2022, with the lowest of ₦8.33 trillion in 1983, indicating higher HCE in 2022 than in any other year under review. Inflation (INFL) reached its peak at 72.83% in 1995 and its lowest at 3.45% in 1972, signifying severe price instability in 1995 and stable prices in 1972. The highest unemployment rate of 5.99% was observed in 2020, while the lowest rate of 3.7% was in 2013, likely due to mass layoffs resulting from the COVID-19 pandemic.

Standard deviation examines the extent to which data is scattered around the line of best fit. The standard deviations for DIV, GDP, GEXP, HCE, INFL, and UNR are ₦8.16 trillion, ₦5.21 trillion, ₦2.72 trillion, ₦1.32 trillion, 15.09%, and 0.47%, respectively. These results indicate that all the variables deviate from the line of best fit and are concentrated more on the right-hand side of this line. Kurtosis measures the degree of presence of outliers in a distribution, indicating whether the data is heavy-tailed (many outliers) or light-tailed (few outliers) relative to a normal distribution. A kurtosis value of 3 is termed mesokurtic, greater than 3 is termed leptokurtic, and less than 3 is termed platykurtic. In this analysis, the kurtosis coefficients for DIV, GDP, GEXP, INFL, and UNR are all greater than 3, indicating that these variables are leptokurtic. Only HCE has a kurtosis coefficient less than 3, making it platykurtic.

Lastly, the Jarque-Bera test assesses whether sample data have skewness and kurtosis consistent with a normal distribution. A test statistic significantly far from zero, with a probability value less than 0.05, suggests non-normal distribution. The null hypothesis, which states that the data distribution is normal, is rejected if the probability value is less than 5%. For DIV, GDP, GEXP, HCE, INFL, and UNR, the null hypothesis is rejected as their probability values are all less than 0.05, indicating abnormal distribution. However, after transforming the raw data, they exhibited a normal distribution. Normality is not necessary for applying statistical techniques if post-estimation tests show that the residuals are normally distributed, free from serial dependency, and homoscedastic. The series were examined to

understand the distribution patterns and potential causes.

4.2 Examination of Unemployment Hysteresis in Nigeria

Unit Root Tests with Structural Breaks (the Cases of Unemployment and Inflation)

The study first applies unit root test with breaks on seasonally adjusted unemployment data in Nigeria for the period 1970 –2022. This ensures that we mitigate estimation bias. Most importantly, this is necessary because the Nigerian macro environment has not been the same since 1970, it has gone through significant changes, and this is likely applicable to unemployment and inflation.

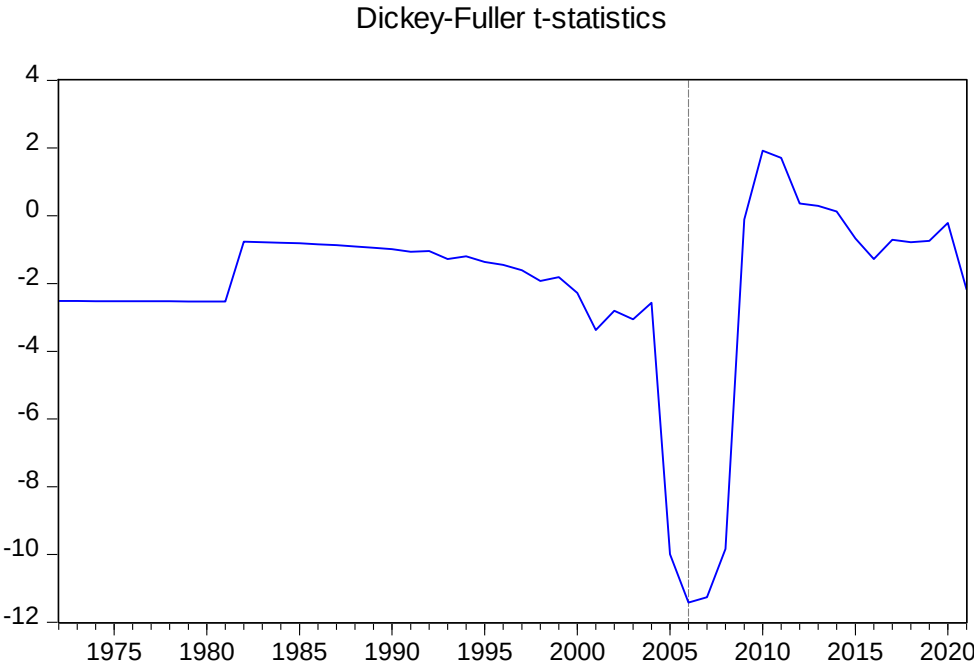

Figure 4.2: *Unemployment unit root test result with structural breaks*

The Dickey-Fuller t-statistics indicate that the Nigerian unemployment experienced a breakpoint in 2006. This led to the implementation of the conventional unit root on 3 datasets – 1970 – 2006, 2007 – 2022 and 1970 – 2022. These periods capture the break in Nigeria's unemployment between 1970 and 2022.

4.3 Unit Root Tests without Structural Breaks

Table 2 present the ADF, ADF-GLS de-trending (ERS) and KPSS unit root tests results for unemployment, which ignore structural breaks. While the Augmented Dickey-Fuller (ADF) and ADF-GLS (ERS) test for the null of a unit root, the KPSS test for the null of stationarity. The study estimates of Half Life estimate with aid of ADF tests with and without a time trend, as well as the estimated auto-regressive root and the derived half-life for the shocks for the ADF test.

Table 4.2: Unit Root Test Result

Period	ADF	Estimate (Half Life)	ADF-GLS	KPSS
1970 – 2022	-2.9446	0.9379	-1.8026	3.7105**
	(0.042)	(0.32)	(0.0730)	(0.0000)
1970 – 2006	-0.6381	0.9878	-0.0118	3.9130**
	(0.8573)	(0.30)	(0.5262)	(0.0000)
2007 – 2022	-0.7581	0.9197	-0.8891	4.3530**
	(0.8228)	(0.33)	(0.3788)	(0.0000)

*Note: ** indicates that the null of stationarity for the KPSS test has not been rejected at the 5% level for the ADF and ADF-GLS tests, but rather the null of a unit root has. The half-life was calculated as: –log(2)/(δ), where δ is the auto-regressive root of unemployment in the ADF test, and it is expressed in quarters.*

Source: Researchers' Computations**.**

Table 4.2 displays the results of three traditional unit root tests, identifying a breakpoint in Nigerian unemployment data from 1970 to 2022. These tests assume both intercept and trend components. The table also includes the estimated autoregressive root from the Augmented Dickey-Fuller (ADF) test for each period and calculates the half-life of unemployment in Nigeria, providing insight into the duration it takes for the mean-reverting time series to return to its mean.

The unit root test results reveal that the null hypothesis of the hysteresis phenomenon in Nigeria's unemployment series from 1970 to 2022 cannot be rejected, indicating the presence of hysteresis in unemployment dynamics during this period. The calculated half-life of the ADF autoregressive root is approximately every 4 months over the 53 years, suggesting that unexpected shocks to the unemployment rate have lasting effects, but the speed of adjustment is relatively fast. This outcome aligns with the findings of Onwukeme and Opeloyeru (2019). However, conclusions based on the full sample period should be approached cautiously due to significant changes in Nigeria's macroeconomic landscape over time.

Examining the two sub-samples (1970–2006 and 2007–2022) also indicates evidence of hysteresis in Nigeria's unemployment dynamics. For the period 1970–2006, the null hypothesis of hysteresis cannot be rejected, with a fast adjustment speed of approximately every 3 months over 37 years. Similarly, for the period 2007–2022, the null hypothesis cannot be rejected, with a calculated half-life of about 4 months over 18 years, indicating a swift adjustment speed. These results suggest that sudden changes in the unemployment rate have a persistent impact. The findings are consistent with the full sample (1970–2022) estimates and support the observations of Onwukeme and Opeloyeru (2019).

4.4 Markov-Switching Regression Analysis

In this section, we present the Markov-switching results for unemployment and

inflation respectively. The Markov-Switching model was estimated for three different periods. The full sample model was estimated with the assumption of no structural break in rates. Relaxing this assumption depending on the result of the structural break unit root results, two different models were estimated. Two regimes were identified in each model; namely: low unemployment rate (regime 1) and high unemployment (regime 2).

Table 4.3: Markov Switching Regression Results - Unemployment

		Full Sample (1970 – 2022)	Sub-Sample (1970 – 2006)	Sub-Sample (2007 – 2022)
Regime 1	Coef	0.3366**	0.3498**	0.0376**
	Std Error	0.0057	0.0032	0.0095
	Z-stat	58.5608	110.0840	3.9189
	p-value	0.0000	0.0000	0.0004
Regime 2	Coef	0.4247**	0.4221**	4.5084**
	Std Error	0.0040	0.0015	0.5047
	Z-stat	106.1216	271.3446	8.9326
	p-value	0.0000	0.0000	0.0000

Source: Researcher's Computations

The complete sample estimation assumes the absence of structural breaks in Nigeria's unemployment rate from 1970 to 2022. Throughout this period, considering variations in government expenditure, the unemployment rate averaged 0.33% during the high unemployment regime and 0.42% during the low unemployment regime. With the inclusion of a breakpoint in the unemployment rate, government expenditure contributed an average of 0.34% for regime 1 and 0.42% for regime 2 from 1970 to 2006. Between 2007 and 2022, the unemployment rate in Nigeria also averaged 0.03% for regime 1 and 4.5% for regime 2.

In all three periods, the estimations are statistically significant at a 5% level, as evidenced by the p-values less than 0.05. This indicates substantial differences between the first and second regimes of the unemployment rate in Nigeria from 1970 to 2022. The constant transition probabilities and expected durations of the unemployment rate in the two regimes (regime 1 for a low rate and regime 2 for a high rate) for all three durations are presented in Table 4.4.

Table 4.4: Unemployment Transition Summary – Probabilities and Durations

	Full Sample (1970 – 2022)	Sub-Sample (1970 – 2006)	Sub-Sample (2007 – 2022)

Transition probabiliti		**Regime 1**	**Regime 2**	**Regime 1**	**Regime 2**	**Regime 1**	**Regime 2**
	Regime 1	0.5802	0.4197	0.9924	0.0075	0.4727	0.5276
	Regime 2	0.5802	0.4197	0.0062	0.9937	0.4727	0.5272
Expecte d		**Regime 1**	**Regime 2**	**Regime 1**	**Regime 2**	**Regime 1**	**Regime 2**
		2.3825	1.7232	13.1730	15.9400	1.8965	2.1153

Source: Researcher's Computations

Table 4.4 shows the transition summary-probability of unemployment and the duration. Regime 1 shows low regime and regime 2 shows high regime. Again, the probability of less than 0.5 shows low regimes and any probability greater 0.5 represent high regime. The transition probability matrices for the three durations suggest that from 1970 to 2006, there was a moderate likelihood of unemployment in Nigeria remaining low (regime 1). Consequently, there were also low probabilities of unemployment transitioning from a high rate (regime 2) to a low rate (regime 1).

In the more recent period (2007 to 2022), characterized by a breakpoint in Nigeria's unemployment, the probability of Nigeria's unemployment changing regimes from low to high is very high, while the probability of unemployment remaining low is very low. This indicates a high likelihood of unemployment moving from a high rate to a low rate, while simultaneously remaining in the regime of a high rate. The implication of these transition probabilities is that the direction of unemployment in Nigeria is unpredictable, and there are equal chances that the phenomenon will shift between low and high rates.

The expected durations for the two regimes of unemployment reveal that it will take approximately 2 years and 4 months for unemployment to remain low before transitioning to a high rate. Similarly, the duration for unemployment to remain high is approximately 1 year and 8 months before transitioning from a high to a low rate.

4.5 Joint Unit Root Test

This time, not to ascertain the presence of hysteresis but to understand the level of stationarity of the series, and how better they could be subjected to autoregression. The unit root test was done using ADF and the results are presented in Table 4.5.

Table 4.5: VAR Unit Root Test

Series	Level Prob.	1st Diff Prob.	Order of Integration	Remarks
UNR	0.0421**	0.0000	I(0)	**Not stationary**
INFL	0.1510	0.0000**	I(1)	**Stationary**

LGDP	0.4860	0.0000**	I(1)	**Not stationary**
LHCE	0.9497	0.0000**	I(1)	**Not stationary**
LDIV	0.9974	0.0059**	I(1)	**Not stationary**
LGEXP	0.9900	0.0000**	I(1)	**Not stationary**

Source: *Researcher's Computations*

Table 4.5 reveals that apart from unemployment rate, all the other series under consideration in this study are not stationary. This means that they were able to achieve stationarity only after they were differenced once. The series (apart from unemployment) are, therefore, integrated of order one. Based on the results of the unit root test, the vector autoregressive model that examines the effect of government expenditure on unemployment and inflation in Nigeria with unemployment at level and all other variables in their first-difference forms. The model is estimated using standard VAR. However, due to the conventional practice, coefficient estimates of a VAR model are usually not interpreted. This is because it is practically needless and of minimal sense to interpret so many lagged estimates for a single phenomenon. A more convenient way of interpreting the estimates of a vector autoregressive process is to analyse the impulse-responses and forecast error variance decompositions. These are presented in the proceeding sections.

4.6 VAR Impulse-Responses

The impulse response function plots the endogenous variables' responses to one-time volatility on their present and future values. The impulse responses are presented in two subsections. First, the study presents the responses of unemployment to its own shocks and to the shocks in other variables, then the responses of inflation are presented in the second section. The impulse responses are presented graphically.

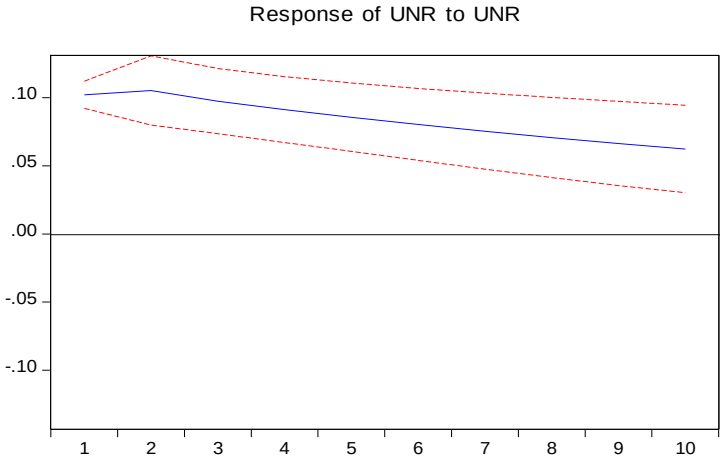

Figure 4.3: Response of unemployment to its own shock

Usually, when a positive change occurs in any phenomenon, it adds to its original state. This means that a sudden positive change in a given variable should increase it. This is the case with Nigeria's unemployment rate**.** Figure 4.3 shows that a positive shock in unemployment rate would affect it positively, even though the magnitude of the effect will decline with time. However, the effect is perceived to be permanent as the response line does not converge to zero throughout the forecast horizon. The result is statistically significant given 5% critical level since the response line falls within the two guidelines.

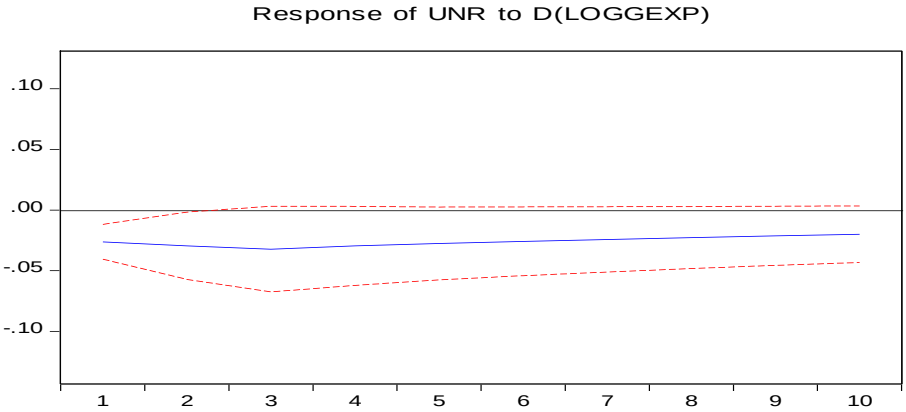

Figure 4.4: Response of unemployment to shock in government expenditure

For the first initial positive shock in government expenditure, unemployment will respond negatively. The response will remain negative and permanent. This implies that government expenditure must government expenditures are not channelled into productive sector that could generate employment and reduce unemployment.

4.7 Forecast Error Variance Decompositions

The overall fluctuations on the endogenous variables in a VAR framework are dispersed across all the contributing elements in the forecast error variance decomposition. Contrary to the impulse response function, which tracks how innovation affects a variable's residuals in relation to other endogenous variables in the VAR framework, this is not the case. This is done to show the proportion of change in the variable of interest that is accounted for by each of the contributing factors (variables) over a period.

Based on the outcomes (variables) of interest for this research, this section presents the variance decompositions of unemployment and inflation in Nigeria.

Table 4.6: Forecast Error Variance Decomposition of Unemployment

Period	S.E.	D(UNR)	INFL	D(LGDP)	D(LHCE)	D(LDIV)	D(LGEXP)
1	0.127407	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.140368	88.95694	2.618040	0.104769	0.002990	6.086489	2.230771

3	0.145191	85.65003	2.616018	0.126858	2.357409	6.994888	2.254793
4	0.147314	84.11417	2.549473	0.131845	2.747527	8.234633	2.222352
5	0.148528	83.17811	2.527421	0.131558	3.151255	8.814116	2.197539
6	0.149219	82.63664	2.554344	0.131247	3.331364	9.167721	2.178682
7	0.149626	82.30841	2.597778	0.130812	3.432561	9.363303	2.167139
8	0.149864	82.11193	2.638892	0.130511	3.485916	9.472497	2.160251
9	0.150003	81.99532	2.670598	0.130312	3.514407	9.533103	2.156261
10	0.150084	81.92692	2.692641	0.130190	3.529689	9.566576	2.153985

Source: Researcher's Computations

Holding other factors constant, the changes in Nigeria's unemployment rate are accounted for by inflation, economic growth, household consumption, domestic investment, and government expenditure). The study analyses the contribution of unemployment to changes in its own behaviour first, then the contributions of the other variables under consideration. These contributions are considered during the first 10 years of the first shock.

In the first year, unemployment contributes 100% to its own changes. This own contribution, however, declines as the number of years increases, leading to steady increase in the contribution of the other factors to changes in unemployment rate in Nigeria. The rate of inflation moves from contributing nothing to the changes in unemployment in the first year to more than 2% in the tenth year. The same pattern is observed in economic growth (0.13% in year 10), household consumption (over 3% in year 10) and domestic investment (over 9% in year 10). For government expenditure, however, as the number of years increases, its contribution to the changes in unemployment declines, moving from 2.23% in the second year to 2.15% in the tenth year. Apart from itself, domestic investment is the highest contributor to the changes in the unemployment rate in Nigeria. This means that domestic investment is the strongest determinant of the changes in the unemployment rate in Nigeria.

5 Discussion of Results, Conclusion and Recommendations

5.1 Discussion of the Hysteresis in Nigeria's Unemployment

Using the ADF, ADF-GLS detrending (ERS) and KPSS unit root tests, the study examined the existence or otherwise of hysteresis in unemployment in Nigeria. The study also reported the estimated auto-regressive root of ADF for each period and then derived the half-lives of both unemployment and inflation in Nigeria. Calculating the half-life of a mean reversion time series helped to measure how long it would take to mean revert. The results of the unit root tests revealed the presence of

persistent in Nigeria's unemployment from 1970 – 2022. The results further revealed that any sudden shock in unemployment would have permanent effects on the unemployment rate. This speed of adjustment is, however, fast due to the speed with which the unemployment rate in Nigeria fluctuates. This result agrees with that of Onwukeme and Opeloyeru (2019); Akaakohol, Akaakohol and Orjime (2019).

To avoid making a misleading conclusion made based on the full sample (1970 – 2021) estimates due to the noticeable changes in the Nigerian economy during that period, the presence of persistent in unemployment in Nigeria was also examined for the two sub-samples (1970 – 2006 and 2007 – 2022). However, the results revealed the evidence of hysteresis in Nigeria, this show unemployment in Nigeria have the tendencies to be hysteric. The calculated half-lives of the ADF auto-regressive roots also revealed substantially fast adjustment speeds. This indicates that any sudden shock in unemployment will have permanent effects on the unemployment rate. This finding is in line with that of the full sample (1970- 2022) estimates and further corroborates the earlier findings of Onwukeme and Opeloyeru (2019); Akaakohol, Akaakohol and Orjime (2019). It is agreeable that unemployment in Nigeria has maintained high rates each year during the period under study. This has defiled the natural rate hypothesis, leading to what can be described as the unnatural rate of unemployment in Nigeria. The evidence established in the hysteresis results suggests that unemployment in Nigeria will never return to the natural rate. The hysteresis hypothesis for unemployment, therefore, holds for Nigeria.

In the light of the breakpoint unit root results, the Markov-Switching model was estimated for three different periods. The full sample model was estimated with the assumption of no structural break in Nigerian unemployment rates. Relaxing this assumption based on the outcome of the structural break unit root results, two different models were estimated. Two regimes were identified in each model; namely: low unemployment rate (regime 1) and high unemployment rate (regime 2). The results indicated that there were substantial differences between the first and second regimes of the unemployment rate in Nigeria between 1970 and 2022. The transition probability matrices for the 3 durations indicated that during the period from 1970 to 2006, there was a moderate probability of unemployment in Nigeria remaining low (regime 1). Consequently, there were also low chances of unemployment moving from a high rate (regime 2) to a low rate (regime 1). In the most recent period (2004 to 2022) when Nigeria's unemployment experienced a breakpoint, the probability of Nigeria's unemployment changing regimes from low to high is low and the same applies to the probability of unemployment remaining low. This means that there are high chances of unemployment moving from a high rate to a low rate and at the same time remaining in the regime of a high rate. The implication of these transition probabilities is that the direction of unemployment in Nigeria is unpredictable and there are equal chances that the phenomenon will change between low and high rates. This justifies the fast adjustment speeds (half-lives)

that were identified during the hysteresis analysis.

5.2 Discussion of the Impact of Government Expenditure on Unemployment in Nigeria

The first initial positive shock in government expenditure, unemployment will respond negatively. The response will remain negative and last only up to the fifth year, implying that the effect of government expenditure on unemployment in Nigeria is temporary. Government expenditure is a fiscal stimulus often used as an expansionary measure to boost economic growth. When government finances are channelled into income-generating activities such as domestic public investments, and payment of wages, more people are likely to be employed, either through public investments or wage-induced private investments. Consequently, the increase in government expenditure pushes unemployment downward, at least in the short run. This finding justifies the Keynes's theory of fiscal stimulus. However, Nigerian unemployment will not likely respond to the positive change in government expenditure permanently due to the hysterical nature of Nigeria's unemployment.

5.3 Conclusion and Recommendation

The conclusions drawn in this section are based on the comprehensive findings presented in the study. The results offer substantial evidence to assert that unemployment in Nigeria exhibits hysteric characteristics. A sustained increase in government expenditure initially reduces unemployment; however, this effect is temporary, diminishing to zero in the long run. The continuous presence of hysteresis in Nigeria's unemployment is not contingent on changes in government expenditure. In the case of inflation, a sudden positive change in government expenditure leads to a short-term increase, followed by a long-term decrease. The study concludes that Nigeria's unemployment situation was found to be hysteric. Thus, any efforts to take it back to the natural rate may not yield results. However, this does not rule out the possibility of a downward change in the macroeconomic variable, especially as the results showed a moderate chance of the rate moving from high to low, and from low to high. Therefore, the government must sustain efforts to keep the rate low, using the non-accelerating inflation rate of unemployment (NAIRU) as the benchmark in other to maintain a minimal unemployment rate. Also, government should channel her expenditure on productive venture and try as much as possible avoid waste and mis-management of useful resources. These will help in closing the gap between employed and the unemployed.

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