Inflation, unemployment and crime rate in Nigeria

ID **Akinola Gbenga Wilfred**

Department of Economic and Business Sciences, Faculty of Commerce and Administration, Walter Sisulu University, South Africa.
Email: gakinola00@gmail.com

ABSTRACT

An acute inflationary economy exacerbates the conditions of the unemployed, potentially making criminal activities more appealing to those without employment. The nexus between unemployment, inflation, and crime rates in any given economy remains a subject of ongoing debate in the literature. Consequently, this article examined the effects of unemployment and inflation on the crime rate in Nigeria, guided by these research questions: (1) What is the trending nexus between inflation, unemployment, and crime rate in Nigeria? (2) What are the effects of unemployment and inflation on the crime rate in Nigeria? (3) What is the direction of causality between unemployment, inflation, and the crime rate in Nigeria? Descriptive statistics, ARDL, and the Toda-Yamamoto causality test were the study's estimating techniques employed to address the research questions. Evidence from the study's outcomes showed that unemployment and government spending on education negatively impact the crime rate both in the short and long run. Furthermore, the Toda-Yamamoto causality result demonstrated the existence of bidirectional causality between educational spending and the crime rate in Nigeria. It clearly indicates that crime rates Granger cause educational spending and vice versa. This implies that as government spending on education fails to reduce school dropout rates, it results in the proliferation of criminal activities. Conversely, the crime rate Granger causes educational spending as a measure to control criminal activities. It is recommended that government expenditure be directed towards appropriate sectors to create employment opportunities for the unemployed, thereby contributing to a decline in the crime rate in Nigeria.

Contribution/Originality: Other research examined the impact of inflation on unemployment, while others investigated the impacts of unemployment on criminality. This study differs from others as it examines the trending nexus, relationships, and causal consequences of the combination of the three concepts—inflation, unemployment, and criminality—with a focus on Nigeria.

1. INTRODUCTION

The escalating crime rate in Nigeria is a growing concern for policymakers. The causal nexus among unemployment, inflation, and crime rate continues to be a topic of active discourse in the literature. This is attributable to theoretical issues that substantiate both psychological and economic aspects as causative elements of crime. Evidence from the literature confirms a scarcity of research investigating the causal relationships among unemployment, inflation, and crime rate. This article investigates the nexus among unemployment, inflation, and crime rates, with particular emphasis on Nigeria. Torruam and Abur (2014) posited that the probability for young individuals to be underemployed, employed in low-quality positions, engaged in hazardous work, or working extended hours for low wages is significantly high due to their inherent vulnerability. There are invariably

consequential effects of inadequate employment opportunities for youth in any given economy. Such effects may be political, socioeconomic, or moral. Nigeria has experienced an increase in crime rates concurrent with rising unemployment. Although it is possible for employed individuals to commit crimes, this is often a result of idleness stemming from underemployment. Unemployment reflects the failure of the central authority to effectively utilize basic factors of production to foster economic growth. The cycle of low returns to labor alongside high unemployment leads individuals to seek alternative options, including criminal activities. Addressing the detrimental effects of crime, unemployment, and inflation in Nigeria's future economy requires more than superficial reporting. The outcome of this article serves as a basis to support the argument that a rise in unemployment reduces income opportunities from the legitimate sector, consequently increasing the likelihood of criminal behavior. Additionally, inflation has direct effects on crime with adverse impacts on an individual's real income.

In terms of organized crime, Nigeria ranked sixth globally (Davies, Engström, Pettersson, & Öberg, 2024). On a scale of 10 points, Nigeria scored 7.28, placing it sixth in the global rankings and second highest in the African continent, following the Democratic Republic of the Congo with 7.35 points (Premium Times, 2023). Crime statistics on reported offenses indicated an average of 134,663 cases reported in 2017. Crime against property was the most frequently reported category, with 68,579 such cases on record. Crime against individuals accounted for 53,641 cases, while crime against constituted authority had the lowest incidence, with 12,443 cases (Davies et al., 2024).

Numerous macroeconomic factors may be responsible for the increasing incidence of crime in Nigeria. This work investigates the historical macroeconomic dynamics of unemployment and inflation to propose a correlation with the rising incidence of crime in Nigeria. Inflation in Nigeria initially arose during the oil boom of the early 1970s. The military government appeared indifferent in implementing sufficient macroeconomic strategies to mitigate inflation through fiscal and monetary policies. The Udoji awards and the structural adjustment program (SAP) executed by the Gowon and Babangida administrations were contentious policies linked to the decline of the Nigerian economy (Mark, 2018).

The Central Bank's endeavors to curtail inflation to single-digit levels by 2012 proved unsuccessful (Akarara & Azebi, 2018). This policy shortcoming can be attributed to the government's enhanced liquidity injections, which lacked an adequate repayment mechanism through a productive workforce. Extant literature in Nigeria reveals notable correlations between fluctuations in unemployment and inflation rates. Currency devaluation in 1973 led to a 15.4% inflation rate, with unemployment reaching 4.3% by 1977. Inflation subsequently rose to 23.2% in 1983, further escalating to 39% and 40.9% in 1984 and 1989, respectively. The economic landscape deteriorated further in the mid-1990s, with inflation rates soaring to 57.2%, 57.0%, and 72.8% in 1993, 1994, and 1995, respectively. In 1986, the Second-tier Foreign Exchange Market (SFEM) was introduced to facilitate a reduction in inflation, which declined to 29.3% by 1996 and further decreased to 8% in 2013. Notwithstanding the efforts of consecutive administrations, the persistent challenges of inflation and unemployment continue to necessitate investigations into their interconnected nature.

The unemployment rate in Nigeria has significant social and economic implications. It results in an increase in crime rates, a higher incidence of poverty, diminished living standards, threats to peace and stability, and decreased investment. Furthermore, it leads to increased dependency, resource wastage, and an escalation in emigration from the country. Despite the Nigerian government's implementation of several strategies to address these issues, unemployment, inflation, and crime rates continue to rise (Oniore & Ezie, 2015).

Inflation can have detrimental effects on the economy, particularly when unanticipated, as it disrupts the price system, results in arbitrary wealth redistribution from debtors to creditors, promotes speculative rather than productive investments, and often incurs high mitigation costs. The job seekers' failure to secure employment can lead to discontent and potentially drive some individuals, especially youth, towards criminal activities and social unrest (Oniore & Ezie, 2015). Efforts by the Nigerian government to address these concerns have evidently proved ineffective, as unemployment, inflation, and crime rates have persistently appeared to follow an upward trend.

Regulating the economy and maintaining low unemployment is a significant challenge, and while past policies have been introduced to address this issue, Nigeria continues to grapple with high inflation, unemployment, and crime rates, posing a substantial hindrance to national security. Past studies on these concepts have appeared to be one-sided. For instance, Rosenfeld (2014), Nunley, Stern, Seals, and Zietz (2016), Rosenfeld and Levin (2016), and Rosenfeld, Vogel, and McCuddy (2019) all studied the nexus between crime and inflation. Lobonț, Nicolescu, Moldovan, and Kuloğlu (2017) and Devine, Sheley, and Smith (1988) investigated the effects of socioeconomic factors on crime rates. Few studies such as Raphael and Winter-Ebmer (2001), Phillips and Land (2012), and Ajimotokin, Haskins, and Wade (2015), also examined the nexus between crime rate and unemployment. However, studies investigating the causal nexus between unemployment, inflation, and crime rates in developing economies like Nigeria are seldom found in the literature. The negative effects of crime on society have short- and long-term economic and social consequences. Neglecting causative factors such as inflation and unemployment may further endanger the economic stability of the system, thereby resulting in macroeconomic disequilibrium and social unrest. Findings from this study could be of immense benefit to scholars for further research as they aim to investigate similar topics.

This study is necessary due to the potential policy mismatch resulting from insufficient knowledge regarding the appropriate nexus among these three macroeconomic variables, given the possibility of close causative links among them. Consequently, the general study objectives are to (i) compare the trending relationship among crime rate, unemployment, and inflation in Nigeria; (ii) examine the effects of unemployment and inflation on the crime rate in Nigeria; and (iii) analyze the causal links between unemployment, inflation, and the crime rate in Nigeria. To achieve the first objective, descriptive statistics through trend analysis have been employed. The study further adopted autoregressive distributive lag (ARDL) to ascertain the appropriate relationships among the macroeconomic variables under investigation, having found the estimating technique suitable for the analysis. Finally, the article investigates the direction of causality through the adoption of the Granger Causality test as stipulated by Toda-Yamamoto to establish the direction of causality among the variables.

This article is structured into three primary segments: the second section extensively examines the reviewed literature. The reviewed literature covers both theories and empirical studies. Section three discusses the methods adopted to conduct the research. Finally, section four analyzes, interprets, and discusses the study's outcomes.

2. THEORETICAL LITERATURE REVIEW

Collard (1981) and McDonald and Solow (1981) citing Pigou posit that the operations of the labour market functions through the interplay of labour demand and supply. The demand for labor is a derivative of the diminishing marginal productivity of labor. This demand curve negatively impacts real wages; when wages increase, the demand for labor declines, and conversely, when wages decrease, the demand for labor rises.

Both Solow (1981) and Pigou (1933) argued that the classical theory emphasizes the interplay of labor supply and demand. Labor supply is determined by individual choices between work and leisure, where the supply of working hours rises as the real wage increases. In equilibrium, the supply and demand for labor intersect to establish the equilibrium real wage rate and achieve full employment. McDonald and Solow (1981) expanded on Pigou (1933) theory, noting that unemployment would be absent if wage-earners fail to typically demand wages above the level of equilibrium. While full employment does not indicate zero unemployment, frictional unemployment remains persistent at the current real wage rate due to information availability, job searches, and fluctuations in labor demand. Some unemployment can also be voluntary, with workers opting not to work due to perceived disadvantages.

Ogujiuba and Cornelissen (2020) observed that downward wage flexibility can maintain full employment by adapting to changing circumstances. Strategies to combat unemployment encompass providing businesses with more affordable credit, government support for private investment, and incentivizing technological innovation through taxation. He also discussed technical unemployment caused by technological advancements, where the initial introduction of machinery might lead to unemployment, but subsequent job searches and wage adjustments could

restore full employment. Further, Ogujiuba and Cornelissen (2020) suggested that advertising and employment agencies can mitigate the typical (frictional) unemployment rate (Ogujiuba & Cornelissen, 2020).

Cyclical unemployment is another form of unemployment, arising from insufficient effective demand. Koliev (2022) proposed increasing wages to encourage increased consumer spending, but cautioned that this could lead to job losses due to higher labor costs. He linked cyclical unemployment to misallocated capital investment, where low rates of return prevailed in certain sectors. He advocated for public works as a viable solution to combat cyclical unemployment, a perspective endorsed by the International Labour Organization (Koliev, 2022).

Pigou (1936) described Keynesian unemployment as an involuntary occurrence, principally influenced by cyclical variations in aggregate demand. Keynes posited that capitalists base their employment and investment decisions on their economic expectations and anticipated profits. When these expectations coincide with reality and favorable economic conditions prevail, investments and employment levels increase progressively, nearing an equilibrium point. This equilibrium denotes the juncture at which aggregate demand meets aggregate supply, often termed the point of effective demand (Nwakanma, Nnamdi, & Omojefe, 2014).

John Maynard Keynes (1883-1946) and his adherents highlighted the relevance of heightened aggregate demand as the principal stimulant to demand-pull inflation. This demand may arise from multiple sources: customers needing increased goods and services for consumption, firms requiring greater raw materials for investment, and governments necessitating more resources to meet civil and military obligations. Aggregate demand includes consumption, investment, and government spending on education. An inflationary gap occurs when aggregate demand surpasses aggregate supply at full employment. The extent of the disparity between aggregate demand and aggregate supply is closely linked to the inflation rate, indicating that a wider gap produces a more significant inflationary impact. Keynes' theory was premised on short-run analysis, assuming fixed prices and establishing prices through non-monetary forces. In Keynesian analysis, the relationship between fluctuations in nominal money income and prices functions indirectly via the interest rate. An increase in the money supply influences the interest rate, which typically declines. Keynes posited that policies aimed at diminishing each element of total demand can effectively mitigate demand pressure and regulate inflation. Strategies including the reduction of government spending or the increase of taxes, in conjunction with the regulation of the money supply, can aid in managing effective demand and mitigating inflation.

Social strain typological theory argues that deviant behavior may be grouped according to an individual's commitment or motivation to cultural objectives and beliefs regarding how they can achieve those goals. The main primary types of social deviance include innovation, ritualism, retreatism, rebellion, and conformity. The theory further suggests that people might engage in deviant actions while pursuing socially accepted goals or values. Some individuals might resort to criminal activities in pursuit of the culturally valued goal of attaining wealth. Deviance in this context can involve disregarding one norm to prioritize another, which is a key concept within the theory of social strain typology.

Conflict Theory asserts that deviant actions stem from disparities in resources among socio-political factions. These factions, delineated by factors such as gender, faith, race, and class, interpret their interests in competition with one another. This implies that these groups perceive societal benefits and entitlements as finite resources, where gains for one faction result in losses for others. When societal hierarchies position certain groups unequally, they may resort to deviant conduct in an attempt to alter these conditions, including the systems that contributed to their formation. Conflict Theory suggests that individuals frequently challenge societal norms to articulate their grievances.

2.1. Empirical Review of Literature

Extensive empirical literature exists regarding the nexus among unemployment, inflation, and crime rates. This existing empirical study examined cross-country studies and country-specific studies. The study investigated the

correlation between crime and inflation, as well as inflation and unemployment. Limited research, like Lobonț et al. (2017) and Devine et al. (1988) have investigated the potential impact of socioeconomic characteristics on crime rates. Several research, including those by Raphael and Winter-Ebmer (2001); Phillips and Land (2012) and Ajimotokin et al. (2015) have analyzed the nexus between crime rates and unemployment.

By utilizing U.S. data from 1950 to 2010, Nunley et al. (2016) examined the relationship between inflation and the prevalence of property crime. Different categories of property crime, which include burglary, larceny, motor vehicle theft, and robbery, were analyzed alongside both narrow and broad definitions of inflation. The variables included in the study explicitly reflected demographic changes and the condition of the business cycle over time. Unobservable or challenging-to-measure factors influencing property crime were accounted for using a stochastic-trend specification. The results indicated a correlation between each of the four property crime rates and inflation. Evidence demonstrated resilience to alternative inflation conceptions, particularly regarding the exclusion or inclusion of certain control variables.

Rosenfeld et al. (2019) examined the nexus between committed crimes for inflation and monetary gain in 17 cities within the US economy between 1960 and 2013. The random coefficients model was adopted to analyze the relationship between acquisitive crime and inflation, while controlling for additional variables. Evidence from the findings indicated a significant direct relationship between acquisitive crime rates and inflation. Variables exhibiting significant heterogeneity across cities in terms of significance, magnitude, and the effects of inflation on acquisitive crime include city-specific coefficients, among others. Further research suggests that an anticipated decline in inflation rates may mitigate future increases in crime within the examined US cities.

Adekoya and Abdul Razak (2016) employed the ARDL model on a CBN statistical bulletin data set from 1970 to 2013 to study the nexus between inflation and crime, as well as preferred methods of curtailing the crime rate in Nigeria. The findings revealed that investment in domestic skills is an alternative tool capable of reducing crime, aside from conventional deterrence measures. The results indicated that inflation impacts crime, including false pretense/cheating, armed robbery as a form of property crime, and arson, all at the 5% significance level. Conversely, investment in domestic acquisition decreases the crime rate at a 1% level of statistical significance, while prosecution slightly reduces crime at a 10% significance level. In the long run, punishment as a measure to control the crime rate failed to adequately reduce crime in Nigeria.

In a study conducted by Al-Zeaud (2014) the potential trade-off relationship between inflation and unemployment and in Jordan from 1984 to 2011 was examined. The research concluded that no causal nexus existed between the two variables throughout the period under investigation, indicating the absence of a trade-off. The study proposed policy measures such as productive projects, labor-intensive initiatives, and initiatives to replace foreign labor with local workers to address unemployment while simultaneously ensuring inflation control for the broader growth of the economy in Jordan.

Idenyi, Favour, Johnson, and Thomas (2017) investigates the nexus between inflation and unemployment in Nigeria. The model utilizing data from 1980 to 2015 indicated that unemployment might be influenced by inflation, total government expenditure, and money supply, all as a percentage of GDP. The estimation techniques employed were the Vector Error Correction Model and causality tests. The evidence presented in the article indicated that the impact of inflation on unemployment is positive at a 5% significance level in Nigeria during the period under review. The results further observed a causal nexus among the study's variables.

Jelilov and Ndanitsa (2015) observed a significant nexus between property crime rates and unemployment, indicating that those with restricted income are mostly prone to engaging in criminal acts for survival purposes. Mohammad (2008) cited family structures, economic constraints and social environment as primary crime determinants. Poverty and inequality are correlated with criminal activity, particularly when economic conditions obstruct education and drive individuals towards criminal affiliations. Martin (2002) confirmed with empirical evidence that disputes the assumption that poverty has a link with terrorism. He argued about the instances of Islamic

extremists in Egypt originating from moderate or lower-middle-class backgrounds, characterized by significant achievement, motivation, and education in science or engineering. Contrary to the assumption that poverty fuels terrorism, examples from Turkey, Bangladesh, Yemen, and Niger indicate otherwise.

Devine et al. (1988) aimed to analyze the nexus between social-control policy and macro-economic impacts on fluctuations in crime rates from 1948 to 1985. Utilizing a social-indicators paradigm, both unemployment and inflation rates were used to assess the overall variability of the national economy. The research employed dynamic modeling methods to examine yearly variations in the rates of robbery, homicide, and burglary. Evidence indicates that the government employs dualistic social control strategies in response to destabilizing economic conditions, aiming to mitigate antisocial behavior while exercising its deterrent capabilities. The results indicate mixed support for the proposed relationship, with the suggested model increasing in strength. The results remain consistent when accounting for fluctuations in two other theoretically important factors: the age distribution of the population and criminal opportunity.

2.2. Gap in Literature

The reviewed studies present compelling evidence that unemployment is the primary catalyst for crime. A multitude of studies indicate that addressing unemployment is essential for mitigating crime rates. Martin (2002) contends that unemployment and poverty do not justify criminal behavior, indicating a divergence in perspectives among researchers that constitutes a gap in the literature. Moreover, other research examined the impact of inflation on unemployment, while others investigated the influence of unemployment on criminality. This study distinguishes itself by examining the trending nexus, relationships, and causal consequences with a focus on Nigeria. This study aims to address the gaps and objectively examine the effects of unemployment and inflation on the rates of crime in Nigeria from 1980 to 2022.

3. METHODOLOGY

This section specifies methodological issues related to analysis and the results of the study.

3.1. The Model's Theoretical Framework for the Study

This model followed the empirical work of Adekoya and Razak (2016) to analyze the contributions of unemployment and inflation on the crime rate in Nigeria. According to him, the *CR* crime rate is a function of *INF* (inflation rate), *GFC* (gross fixed capital formation), and *PG* (population growth).

$$CR = f(INF, GFC, PG) \tag{1}$$

3.2. The Study's Model Specification

The study modified the model above to express a linear relationship between crime rates as an endogenous variable and the corresponding explanatory variables below:

$$CR_t = \int(INF, UEMP, GEXPE, PG) \tag{2}$$

The implicit model is expressed econometrically as follows;

$$CR_t = \rho_0 + \rho_1 INF_t + \rho_2 UEMP_t + \rho_3 GEXPE_t + \rho_4 PG_t + \rho_5 HC_t + \sigma_I \tag{3}$$

Where:

CR represents crime rate.

INF proxies inflation rate.

UEMP represents unemployment rate.

GEXPE is government expenditure on education.

PG is population growth.

HC is Human Capital.

Meanwhile, the unknown parameters ρ_1 ρ_2 ρ_3 ρ_4, are the coefficients or the slope of *INF, UEMP, GEXPE and PG* respectively, while intercept ρ_0, and the error term σ_I are the unexplained random terms.

Apriori expectation requires that;

$$\frac{CR}{GEXPE} < 0, \frac{CR}{UEMP} > 0, \frac{CR}{PG} > 0, \frac{CR}{HC} < 0, \frac{CR}{INF} > 0$$

To fulfill the study's third objective, the causality test was structured in alignment with the effective testing paradigm proposed by Breitung and Candelon (2006). This article also addresses a gap in the literature by discussing the causal relationship among inflation, unemployment, and crime rates in the country. The initial stage in Granger causality involves transforming the model's time series attributes into the frequency domain using discrete Fourier transformation. This transformation demonstrates the frequency mechanisms present in the modeled data. The altered discrete frontier (K) in the sequence $[n]$ of length N can be approximated as:

$$Q[c] = \sum_{n=0}^{N-1} y[n] e^{-i\frac{2\pi}{N}cn} \qquad (4)$$

Where: Q [c] represents the Fourier coefficient of the frequency c, q [n] is the sequence in the time domain, and C represents the frequency index, with a value between 0 and N−1.

Test for Granger causality assesses the possibility that past values of one variable provide significant information for predicting the future values of other variables. This study employs the Granger causality test as modeled by Granger (1988).

$$P = \gamma_0 + \sum\alpha_i P_{t-i} + \sum\alpha_i Q_{t-i} + \vartheta_t$$
$$Q = \delta_0 + \sum\varphi_i Q_{t-i} + \sum\sigma_i P_{t-i} + \theta_t \qquad (5)$$

P and Q are two divisible variables, while ϑ-t and θ-t represent the dynamics of uncorrelated random values. The causal link shown in a bidirectional pattern occurs when θi and θi are critically stable. P Granger-causes Q if αi is truly significant. Conversely, Q Granger-causes P with the presumption that δi is significantly elevated. This phenomenon is sometimes referred to as unidirectional causality.

3.3. Methods and Sources of Data Gathering

The article aims to examine the effects of inflation and unemployment on the crime rate using data from 1980 to 2022. The data for the study were obtained from the World Bank, the CBN, and the National Bureau of Statistics. The dataset contains a 42-year annual time series. The extensive temporal coverage enhances the analysis of the dataset's distinctive attributes and behaviors, thereby improving the accuracy of forecasts. The variables selected to examine the nexus between unemployment, inflation, and crime rates were both theoretically and empirically substantiated.

The study anticipates a level of multicollinearity among the selected variables. Human capital may correlate with population increase, as it is theoretically considered a component of a country's population. However, in the event of occurrence, the study ran a number of diagnostic tests to confirm the reliability and validity of the findings and to determine if such an association could adversely affect the outcomes. We were advised to retain the variables (as key variables) in the study, as we noted that such correlation does not adversely affect the study's outcomes.

3.4. The Auto-Regressive Distributive Lag and Bounds Testing

The article rigorously engaged the Auto-regressive Distributive Lag (ARDL) Bounds test established by Pesaran, Shin, and Smith (2001). This strategy was selected to fulfill target two. It is generally regarded as the optimal approach for analyzing the nexus among macroeconomic variables, overcoming the shortcomings of co-integration techniques. The ARDL bounds test offers numerous advantages: firstly, it does not necessarily require all macroeconomic model variables to be integrated at first difference. This indicates its capability to examine variables that are integrated at first difference (I(1)) or stationary at level (I(0)). Furthermore, it is suitable for analyzing small

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sample sizes. Additionally, it assumes that all macroeconomic factors are endogenous. Ultimately, it estimates both short- and long-run parameters simultaneously. In this article, the Hannan-Quinn information criterion is used as the optimal lag length criterion for estimating the ARDL model. This criterion was chosen because of its unique characteristics.

$$CR_t = \rho_0 + \sum_{i=1}^{k} \beta_1 LN\Delta CR_{t-i} + \sum_{i=1}^{k} \beta_2 \Delta LINF_{t-i} + \sum_{i=1}^{k} \beta_3 \Delta UEMP_{t-i} + \sum_{i=1}^{k} \beta_4 \Delta LNGEXPE_{t-i} +$$
$$\sum_{i=1}^{k} \beta_5 \Delta PG_{t-i} + \sum_{i=1}^{k} \beta_6 \Delta HC_{t-i} + \beta_7 LNCR_{t-i} + \beta_8 LNINF_{t-i} + \beta_9 UEMP_{t-i} + \beta_{10} LNGEXPE_{t-i} + \beta_{11} PG_{t-i} +$$
$$\beta_{12} HC_{t-i} + \gamma ecm_{t-i} + \sigma_I \qquad (6)$$

Where Δ signifies the operator difference, representing the short-run components, with the corresponding error correction and the error term, respectively. A variable is classified as co-integrated if the calculated F-statistic surpasses the upper bound critical values; otherwise, they are regarded as not co-integrated.

3.5. Analysis Section: Trend Analyses

This section examines the complex nexus between crime rates, inflation and unemployment in Nigeria. Figure 1 depicts the evolution of crime rates in the country. The data revealed that crime rates were notably low from 1970 to 1980, followed by a brief upward trend from 1980 to 1985, and a subsequent decline. Since 1987, Nigeria has experienced a significant upward trajectory in crime rates, marked by periodic fluctuations. A recent increase in criminal activity has been observed since 2020. The elevated crime rates in Nigeria may be attributed to factors such as poverty, unemployment, and corruption. The ongoing population growth has exacerbated the government's ability to provide adequate employment opportunities for its workforce, potentially driving some individuals to engage in illicit acts as a means to survive economic hardship. Interestingly, the graph indicates that the crime rate in 2018 surpassed that of 2020, a decrease that can be attributed to improved security measures implemented to combat criminal activities in the nation.
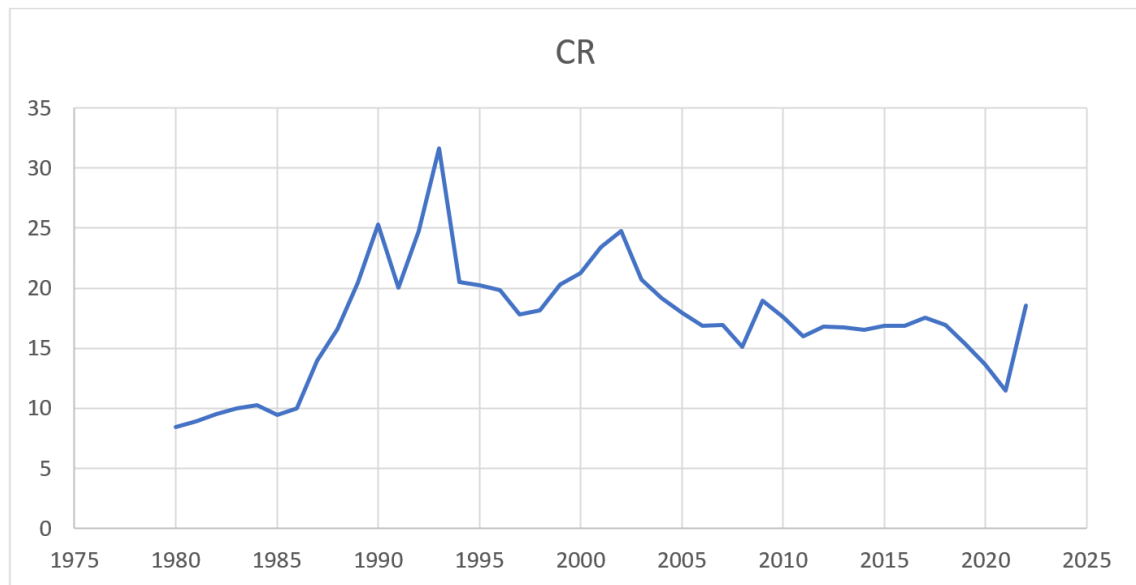

Figure 1. Trend of crime rate in Nigeria.

Figure 2 illustrates the trend of inflation in Nigeria over a specified time period. The data presented in the figure indicates that inflation in Nigeria has exhibited instability over time. During the period from 1980 to 1985, Nigeria experienced low levels of inflation due to a reduction in government spending and the implementation of an effective tightening monetary policy (Musa, Magaji, & Salisu, 2022). However, following the economic boom in 1985, the inflation rate began to increase. This rise can be attributed to a surge in commodity demand accompanied by a

marginal increase in investment, which potentially exerted pressure on the value of currency in circulation, thereby leading to an increase in the country's inflation rate.
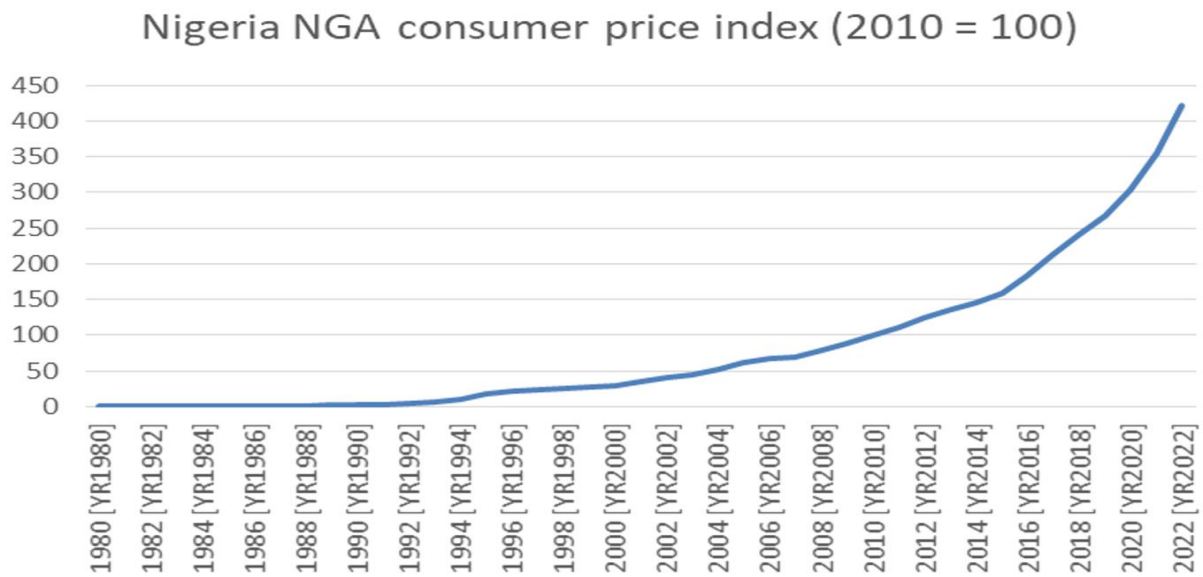

Figure 2. Trend of inflation in Nigeria.

Figure 3 illustrates the trend analysis of unemployment in Nigeria. In 1980, Nigeria experienced a low unemployment rate, primarily attributable to the majority of citizens engaging in subsistence farming within an agrarian system. However, from 1990, unemployment began to increase as the population grew. Between 1990 and 2012, unemployment rates remained relatively stable. Beyond this period, the unemployment rate in Nigeria has risen, with contributing factors including overpopulation, corruption, and mismanagement of economic resources. It is imperative to implement policies and strategies aimed at reducing unemployment in Nigeria.
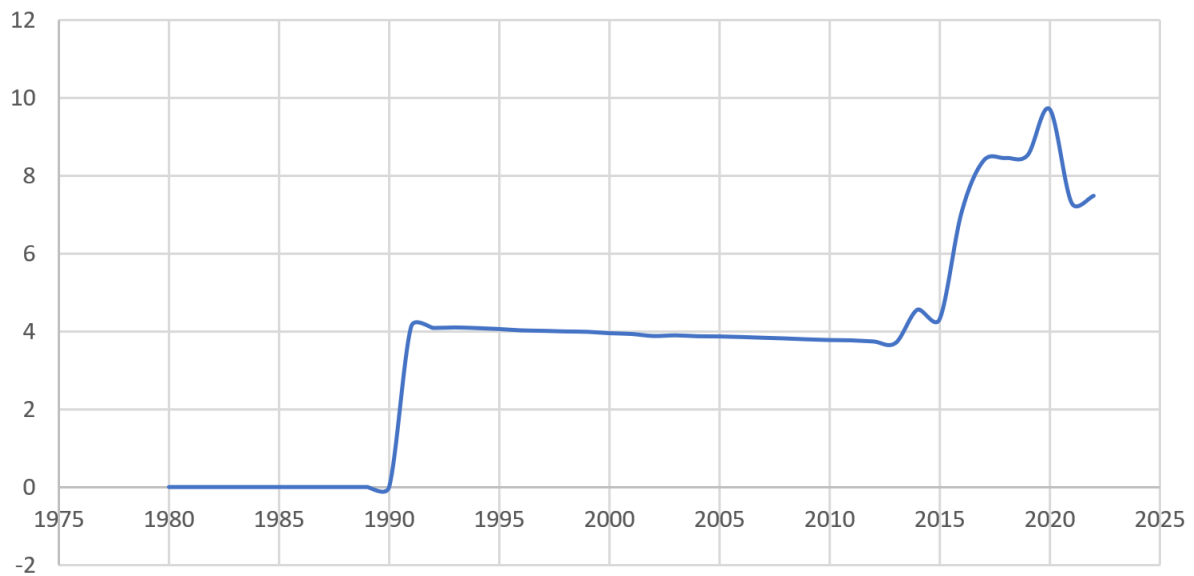

Figure 3. Trend of unemployment rate in Nigeria.

3.6. Descriptive Analysis

This section addresses descriptive analysis, measuring the central tendencies such as the mean, median, and mode, as well as variability, asymmetry, peakedness, the Jarque-Bera test, likelihood, total, and the sum of squared deviations for each variable in this research.

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Table 1. Descriptive statistics.

Variables	CR	GEXPE	INF	HC	PG	UNEM
Mean	1.419	612.631	18.952	1.506	2.628	3.963
Median	0.000	350.171	12.537	1.459	2.614	3.893
Maximum	33.600	1519.660	72.835	1.974	3.003	5.206
Minimum	0.000	242.556	5.388	1.196	2.448	3.695
Std. dev.	6.331	454.293	17.086	0.265	0.117	0.331
Skewness	4.372	1.11861	1.809	0.315	1.004	2.524
Kurtosis	20.901	2.633	5.053	1.645	4.307	8.700
Jarque-Bera	644.960	8.352	28.134	3.631	9.333	94.200
Probability	0.000	0.015	0.000001	0.163	0.009	0.000
Sum	55.340	23892.60	739.145	58.734	102.491	154.565
Sum sq. dev.	1523.062	7842536	11093.93	2.664	0.518	4.1533
Observations	39	39	39	39	39	39

The results of the descriptive statistics are presented in Table 1. The mean values for crime rate (CR), inflation (INF), unemployment (UEMP), government expenditure (GEXPE), population growth (PG), and HC are 1.42, 18.95, 3.96, 612.6, 2.63, and 1.51, respectively.

Whereas, the median values of crime rate (CR), inflation (INF), unemployment (UEMP), GEXPE, and population growth (PG) are 0.00, 12.54, 3.89, 350.2, 2.6 and 1.46, respectively.

The standard deviation indicates that GEXPE exhibits the most volatility (454.3), suggesting that observations for GEXPE deviate significantly from the sample mean. Conversely, population growth (PG) displays the lowest volatility (0.12), indicating that observations for PG are closely aligned with the sample mean.

The skewness statistics indicated that all the variables are positively skewed, i.e., crime rate (CR), inflation (INF), unemployment (UEMP), government expenditure (GEXP), population growth (PG), and HC.

The Jarque-Bera statistic failed to reject the null hypothesis of normal distribution for three variables: inflation (INF), government expenditure (GEXP), and population growth (PG) at a 5% level of significance. Conversely, the null hypothesis of normal distribution was rejected for three other variables: crime rate (CR), unemployment (UEMP), and (HC).

3.7. The Result for the Correlation Analysis

The analysis of correlation quantifies the extent of connection between multiple variables. In this study, we assess the nexus between the endogenous variable (GDPG) and the explanatory variables (INF, LDR, INT, M2, EXR) through a correlation matrix, as detailed in Table 2.

Table 2. Correlation matrix.

Variables	CR	GEXPE	INF	HC	PG	UNEM
CR	1.000	0.450	–0.067	0.346	–0.205	0.382
GEXPE	0.450	1.000	–0.285	0.917	–0.148	0.627
INF	–0.067	–0.286	1.000	–0.382	–0.232	–0.032
HC	0.346	0.917	–0.382	1.000	–0.039	0.469
PG	–0.205	–0.149	–0.232	–0.039	1.000	–0.525
UNEM	0.382	0.627	–0.032	0.469	–0.525	1.000

The correlation results from Table 2 indicated that the independent variables GEXPE, HC, and UNEM exhibited positive associations of approximately 45%, 35%, and 38% with the dependent variable CR, respectively. Conversely, INF and PG demonstrated negative correlations of 7% and 20.5% with CR, respectively. These results suggest that the model is free from potential multicollinearity.

3.8. The Result of the Unit Root Test

This article emphasizes the importance of assessing the time series nature of the variables under investigation. Consequently, a test for stationarity using the Augmented Dickey-Fuller (ADF) procedure has been conducted to confirm the nature of the study's variables, and the results of this analysis are presented in Table 3.

Table 3. The result of the unit root test.

Variable	ADF test					
	AT I (0)			AT I (1)		
	t-statistics	Prob. value	Status	t-statistics	Prob. value	Status
CR				–5.678	0.000	I (1)
INF	–3.902	0.021	I (0)			
UEMP				–6.526	0.000	I (1)
GEXPE				–7.385	0.011	I (1)
PG				–5.913	0.000	I (1)
HC	29.485	0	I(0)			

The results of the unit root analysis indicated that inflation and HC are stationary at the level, while others are not. Specifically, CR, UEMP, and GEXPE achieved stationarity after first differencing. Consequently, it is essential to establish the relationship among the variables using the ARDL bound test.

3.9. Optimal Lag Length Criteria

To enhance the reliability and consistency of the results, it is crucial to utilize an appropriate lag selection criterion. Determining the optimal lag order is essential. Table 4 outlines the lag length criteria, with specific consideration given to the AIC, and the information from the Hannan-Quinn (HQ) will be employed in this study.

Table 4. Showing the result of the optimal lag length criteria.

Lag	Log L	LR	FPE	AIC	SC	HQ
0	–1299.066	NA	1.4×10^{22}	65.203	65.414	65.279
1	–1170.186	219.096	8.02×10^{19}	60.009	61.274	60.467
2	–1118.522	74.913*	2.25×10^{19}*	58.676*	60.998*	59.516*

Note: * shows the lag order chosen by the criterion (Each test at 5% level).

Building upon the outcomes presented in Table 4, the lag selection criteria tests indicate that all information criteria, including FPE, LR, AIC, and HQ, have chosen lag 2 as the optimal lag length. Consequently, to ensure consistent and valid results, all analyses conducted in this article will be estimated using a lag of 2.

3.10. The Result of the ARDL Bounds Test

Applying the autoregressive distributive lag bound test, the results suggest that, in the event of strong exogeneity of variables, the hypothesis of the existence of a long-run nexus may be accepted at a 5% level of significance.

The acceptance is supported by the F-statistic of 3.74, which surpasses the upper bound of 3.49 and the lower bound of 2.56. This indicates the presence of a long-term nexus between the endogenous variable (CR) and the explanatory variables (INF, UEMP, GEXP, PG).

Table 5 presents the results of the ARDL F-bounds co-integration test conducted to investigate the impact of inflation and unemployment on the crime rate in Nigeria from 1980 to 2022. The analysis assesses the significance of the F-statistic and compares it against critical value bounds at different significance levels.

Table 5. Showing the result of the bounds test.

Test statistics	Value	K
F-statistics	3.748	4
Bounds' critical value		
Sig.	I (0) bound	I (1) bound
10%	2.2	3.09
5%	2.56	3.49
2.50%	2.88	3.87

The F-statistic is approximately calculated to be 3.748, with a degree of freedom k equal to 4. To determine the significance of this statistic, it is compared to the critical value bounds provided in the table. At a 10% significance level, the critical value bounds are 2.2 (I0 bound) and 3.09 (I1 bound). Since the F-statistic exceeds both these bounds, the study concludes that the relationship between the variables is statistically significant at the 10% level. Similarly, at the 5% significance level, the critical value bounds are 2.56 (I0 bound) and 3.49 (I1 bound). Again, the F-statistic surpasses these bounds, indicating statistical significance at the 5% level. The results suggest that there exists a long-run relationship between inflation, unemployment, and the crime rate from 1980 to 2022 in Nigeria. The statistically significant F-statistic indicates that changes in these independent variables have a significant impact on the dependent variable, the crime rate, in the long run.

3.11. ARDL Short and Long Run Estimates

The ARDL bounds analysis is an estimation approach used to assess the interrelationship between short-term dynamics and long-term relationships among the study's variables. The ARDL model introduced by Pesaran and Shin (2001) serves to explore both short-term and long-term coefficients of the variables under investigation. The results of the ARDL test indicate that in the short run, the analysis reveals that two (2) variables have a significant impact on the crime rate (CR), as indicated in Table 6. The results revealed that unemployment (UEMP) is positive and significantly impacts CR. It therefore implies that a 1% change in UEMP will result in a 68% increase in the CR rate in Nigeria. This demonstrates that as unemployment increases in the country, the rate of crime will also continue to increase, which aligns with the findings of Ojo, Omojuwa, and Oludare (2021) in their analysis of the causes of crime rate in Nigeria. They found that unemployment has a significant positive influence on the crime rate in Nigeria in both the short and long run. Additionally, the population growth rate (PG), being significant, impacted negatively on the crime rate in the short run. This implies that a 1% change in PG on average will decrease the crime rate by 1.26% in Nigeria. This indicates that as the population continues to grow, the crime rate has the potential to decrease in Nigeria. This phenomenon may occur in Nigeria, where the increased population is utilized more productively in the planned economy. The productive population reduces excess idle time, leading to a reduction in the crime rate.

In the long run, it is observed that three variables, namely UEMP, GEXPE, and PG, significantly influence CR. According to Table 6, UEMP has a positive and significant influence on CR in the long term. This implies that a 1% change in UEMP will lead to approximately a 0.5% increase in CR in Nigeria. Furthermore, GEXPE has a positive and significant influence on CR, indicating that a 1% change in GEXP in the long term will result in a 4.9% increase in CR. This suggests that increased government spending in the economy over the long term has not effectively addressed the problem of crime in Nigeria but may have potentially exacerbated insecurity. This may occur in cases where government spending is low on education and human capital development but remains high in less productive sectors of the economy. In the long term, PG also has a positive and significant influence on CR; a 1% change in PG will result in a 5.1% increase in CR. This indicates that the increase in productive population in the short term could not be sustained over the long term. Consequently, it becomes one of the factors contributing to the rise in crime rates in Nigeria.

The results demonstrate a significant F-statistic of 10.10118, with a Prob (F-statistic) of 0.000000, indicating a statistically significant combined effect of the exogenous variables on the dependent variable. Moreover, the multiple

coefficient of determination, R², stands at 0.893024, suggesting that 89% of the variance in the dependent variable (CR) can be explained by the exogenous variables (INF, UEMP, GEXPE, PG), while the remaining 11% is attributed to unaccounted factors.

The DW statistic is 2.347656, indicating no serial correlation within the study's model. The ECT at lag (-1) suggests that 23% of short-run disequilibrium will adjust to long-run equilibrium, implying a lag period of 23 years for the adjustment process to occur.

Table 6. ARDL short and long run estimates. Dependent variable: CR.

Coefficient (Short run result)			Coefficient (Long run result)		
Vars	**Coeff.**	**P-value**	**Vars**	**Coefficient**	**P-value**
D(INF)	−0.052	0.877	INF	−0.093	0.446
D(UEMP)	0.681	0.024	UEMP	0.505	0.035
D(GEXPE)	1.903	0.632	GEXP	4.942	0.032
D(PG)	−1.256	0.000	PG	5.055	0.028
HC	7.406	0.359	HC	7.405	0.359
C	67.065	0.023	C	174.036	0.014
ECT (-1)	0.231		0.001		
R-squared			0.893		
Adjusted R²			0.814		
F-stat			10.101		
Pr (F-stat)			0.000		
Mean endogenous v			17.681		
S.D. dependent var			4.615		
Durb-Wat statistics			2.387		

3.12. Granger Causality Test

Table 7 presents the findings of the Toda-Yamamoto causality test, which examines the direction of causality among the investigated variables. The results indicate the existence of bidirectional causality between educational spending and the crime rate in Nigeria. Specifically, the findings demonstrate that crime rates Granger cause educational spending and vice versa. This suggests that when government spending on education fails to reduce school dropout rates, it may contribute to an increase in criminal activities.

Table 7. The Toda-Yamamoto causality.

Null hypothesis:	F-statistic	Prob.	Decision
GEXPE failed to granger cause CR	14.373	0.004	Bidirectional
CR failed to granger cause *GEXPE*	3.654	0.037	
HC failed to granger cause CR	5.881	0.006	
CR failed to granger cause HC	0.031	0.969	Unidirectional
PG failed to granger cause CR	0.227	0.798	
CR failed to granger cause PG	1.010	0.375	No causality
UNEM failed to granger cause CR	13.121	0.007	
CR failed to granger cause UNEM	1.640	0.209	Unidirectional
HC failed to granger cause *GEXPE*	2.519	0.095	
GEXPE failed to granger cause HC	0.776	0.468	Unidirectional
PG failed to granger cause *GEXPE*	4.862	0.014	Bidirectional
GEXPE does not granger cause PG	3.791	0.032	
UNEM failed to granger cause *GEXPE*	30.554	0.003	Bidirectional
GEXPE failed to granger cause UNEM	4.606	0.017	
PG failed to granger cause HC	1.117	0.339	
HC failed to granger cause PG	1.196	0.314	No Causality
UNEM failed to granger cause HC	5.284	0.010	
HC failed to granger cause UNEM	4.399	0.020	Bidirectional
UNEM failed to granger cause PG	5.471	0.008	
PG failed to granger cause UNEM	1.299	0.286	Unidirectional

Conversely, the crime rate Granger causes educational spending; as the government reviews its spending policies and their effects on youth, it is compelled to increase spending in response to rising crime rates. This occurs when dissatisfaction with the returns to education outweighs its benefits, leading youth to engage in criminal activities. The results also provide evidence that unemployment Granger causes the crime rate in Nigeria.

3.13. Post Estimation Analysis

3.13.1. Test for Serial Correlation LM Test (Breusch-Godfrey)

Since the probability value exceeds the 5% significance threshold, the null hypothesis regarding serial correlation is not rejected. Therefore, it can be concluded that serial correlation is absent, and the model conforms to a normal distribution.

Table 8. Result showing the test for serial correlation, LM test (Breusch-Godfrey).

F-stat	1.084	Prob. F (2,27)	0.352
Obs R²	3.047	Prob. Chi-square (2)	0.217

Table 8 presents the results of the serial correlation test used to evaluate the efficiency and reliability of the parameter estimates. If the p-value of the observed R-squared exceeds 5 percent, the null hypothesis indicating no serial correlation in the model is accepted; otherwise, the null hypothesis is rejected in favor of the alternative. In this study, with one lag and a sample of 42 observations, the p-value was greater than five percent for the observed R-squared. This indicates that the model does not exhibit serial correlation, as shown in Table 8.

3.13.2. Heteroskedasticity Test: Breusch-Pagan-Godfrey

Given that the value of the probability exceeds the 5% significance level, this suggests that the null hypothesis concerning heteroskedasticity is not rejected (See Table 9). This, in turn, signifies that heteroskedasticity is absent, and this further confirms the model's adherence to a normal distribution.

Table 9. Result showing the result for heteroskedasticity test.

F-statistic	1.472	Prob. F (9,31)	0.302
Obs R²	12.276	Prob. Chi²	0.298
Scaled explained SS	5.536	Prob. Chi²	0.685

3.13.3. Normality Distribution Result (Histogram)

The analysis of the Figure 3 indicates that the Jarque-Bera probability value exceeds 5%, leading to the non-rejection of the hypothesis regarding the normal distribution of residuals. Consequently, it can be concluded that the model conforms to a normal distribution.
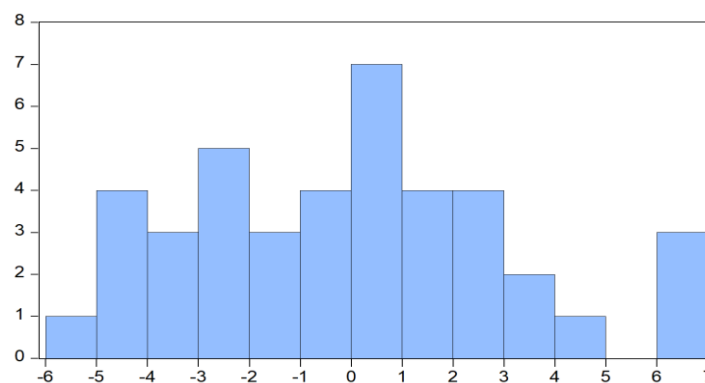

Figure 3. Histogram-normality test.

3.13.4. Cumulative Sum of Recursive Residual (Cusum)

Figure 4 indicates that the model is dynamically stable because the trend lines fall between the upper and lower boundaries, as seen in the diagram.
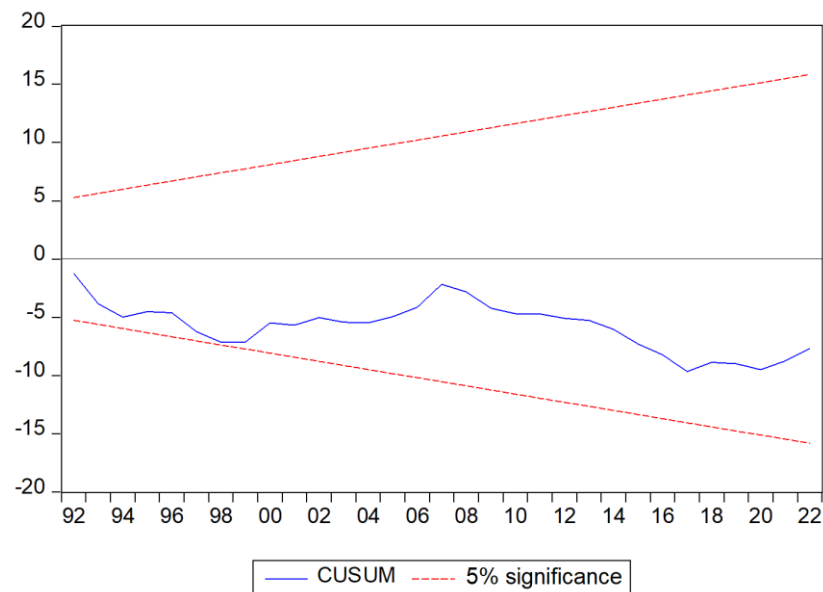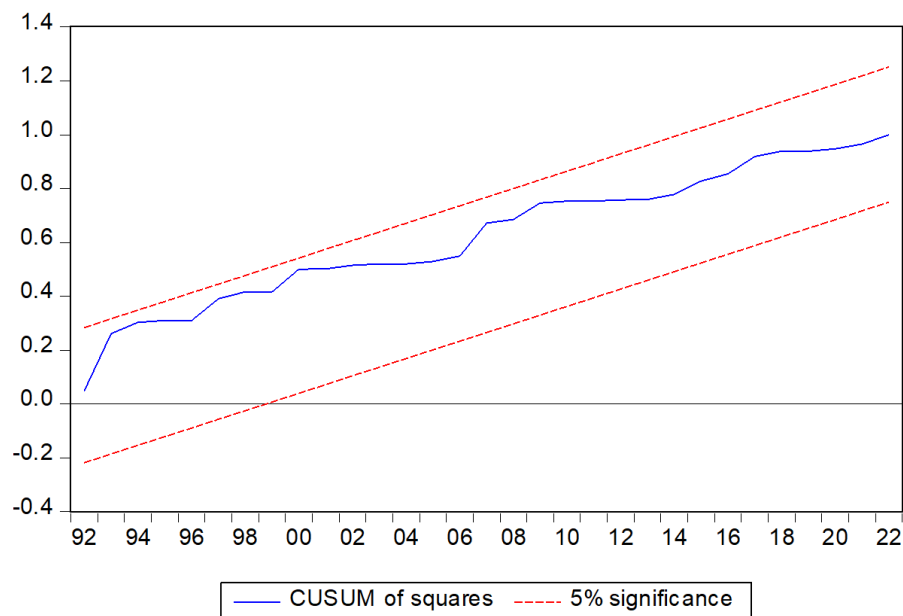

Figure 4. Cumulative sum of recursive residual (CUSUM).

3.13.5. Cumulative Sum of Square Test (CUSUM of Squares)

Figure 5 indicates that the model is dynamically stable because the trend lines fall between the upper and lower boundaries as seen in the diagram.

Figure 5. Cumulative sum of square test (CUSUM of squares).

4. DISCUSSION OF FINDINGS

This article examined the effects of inflation and unemployment on the crime rate in Nigeria over a span of 41 years. The study utilized comprehensive descriptive statistical analysis in conjunction with ARDL and Toda-

Yamamoto causality tests as the estimation techniques. Post-estimation tests, specifically serial correlation, heteroskedasticity, and histogram normality, were performed.

Descriptive data indicated significant variability, with inflation (INF) exhibiting the largest volatility (16.51) and population growth (PG) the lowest (0.08). All variables demonstrated positive skewness.

The Jarque-Bera tests confirmed a normal distribution for inflation (INF), government spending (GEXPE), and population growth (PG), while rejecting it for crime rate (CR) and unemployment (UEMP). Unit root testing validated the necessity of employing the ARDL model in the analysis. The constrained test established enduring correlations among variables. The ARDL model revealed a short-term effect of unemployment (UEMP) and government expenditure (GEXPE) on crime rate (CR); however, in the long term, unemployment (UEMP), government expenditure (GEXPE), and population growth (PG) significantly influence CR.

The results revealed a highly significant F-statistic (10.10118), suggesting the collective impact of explanatory variables on the endogenous variable. The corresponding coefficients of determination (R^2) at 0.893024 indicate that 89% of the variance in CR is explained by the independent variables (INF, UEMP, GEXP, PG), while the remaining 11% is attributed to unaccounted causes. A Durbin-Watson score of 2.347656 indicates there is no serial correlation. The Error Correction Model at lag (-1) indicated 23% short-run disequilibrium adjustment to long-run equilibrium, corresponding to approximately 2.3 years.

The outcomes of this article enhance the extant body of knowledge in specific ways:

It demonstrates that unemployment greatly affects the crime rate both in the short and long term in Nigeria. Nonetheless, government expenditure did not appreciably affect the crime rate in Nigeria in the medium term. This outcome was rectified over time, with government expenditure significantly influencing the crime rate in Nigeria in the long term. The findings indicated that unemployment (UEMP) is positively correlated and strongly influences CR. This indicates that a 1% variation in UEMP will result in a 68% CR rate in Nigeria in the short term. This suggests that, over time, a 1% variation in UEMP will result in approximately a 0.5% increase in CR in Nigeria. This outcome aligns with the findings of Jelilov and Ndanitsa (2015), who emphasized that those with restricted income were more predisposed to criminal behavior. Nonetheless, the outcome contradicts the conclusions of Martin (2002), who provides empirical evidence indicating that poverty (unemployment) is not a fundamental factor of terrorism. He provides instances of Islamic terrorists in Egypt originating from middle or lower-middle-class origins who have attained significant accomplishments yet engage in criminal activities. This indicates that rising unemployment in the country correlates with an increase in crime rates, consistent with the findings of Ojo et al. (2021), who determined that unemployment exerts a significant positive influence on crime rates in Nigeria, both in the short and long term. As unemployment in Nigeria escalates, idle individuals resort to crime as a means of survival. Government expenditure has failed to address the issue of rising crime, as funds and resources are not allocated to the appropriate sectors that could alleviate unemployment. Ultimately, it has been determined that population growth positively correlates with crime rates, as an excess population coupled with limited resources leads individuals lacking satisfactory employment to resort to criminal activities for survival.

In both the short and long term, inflation did not substantially affect crime rates in Nigeria. This indicates that fluctuations in the purchasing power of currency are unrelated to the increasing crime rate in Nigeria. This outcome contradicts the findings of Rosenfeld et al. (2019), who identified a positive correlation between inflation and crime in the USA.

The study additionally noted that two variables, GEXPE and PG, significantly impacted CR in the long term. In the short term, government expenditure does not significantly affect crime rates, although it does in the long term. Moreover, GEXPE exerts a positive and substantial effect on CR, suggesting that a 1% variation in GEXPE over the long term will lead to a 4.9% rise in CR. This indicates that prolonged government expenditure in the economy has not addressed the issue of crime in Nigeria but has instead exacerbated insecurity. This occurs when government expenditure on education and human capital development is low, while being elevated in less productive sectors of

the economy. The needs of the youth were not addressed nor prioritized in the Nigerian government's expenditure. Ultimately, population growth exerts a large positive impact on capital return; a percentage change in population growth corresponds to a 5.1% increase in capital return, indicating that the short-term rise in the productive population cannot be maintained over the long term. Thus, it emerges as a contributing reason to the rising crime rate in Nigeria. Excessive focus on increasing the number of children without sufficient emphasis on education leads to the proliferation of crime. This situation is prevalent in northern Nigeria, where population expansion escalates without adequate governmental measures to provide decent education for the future.

Our findings from the research on the Toda-Yamamoto causality mechanism significantly enhanced existing knowledge by examining potential causal relationships among variables using this methodology. The study revealed a bidirectional causal relationship between educational expenditure and crime rates in Nigeria. It clearly demonstrates that crime rates Granger-cause educational expenditure and vice versa. This indicates that insufficient government expenditure on education fails to reduce school dropout rates, thereby fostering criminal activity. The crime rate Granger-causes educational expenditure. As the government evaluates policies on expenditure and their impact on youth, it has no choice but to increase expenditures in response to rising crime rates. This occurs when discontent from resuming education exceeds its benefits. Under such circumstances, youth engage in criminal activity. The results also indicate that unemployment Granger-causes the crime rate in Nigeria.

The results of this study indicate that the study objectives have been met. It is recommended that governmental resources be allocated to appropriate sectors to create employment opportunities for the unemployed population, thereby contributing to the reduction of crime rates in Nigeria. Education has the potential to mitigate unemployment; therefore, government expenditure should prioritize the enhancement of the educational sector, and policies and programs should be established to facilitate access to education for disadvantaged individuals. Policies to address population growth in Nigeria, including birth control measures, should be implemented, with the provision of necessary resources for citizens.

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